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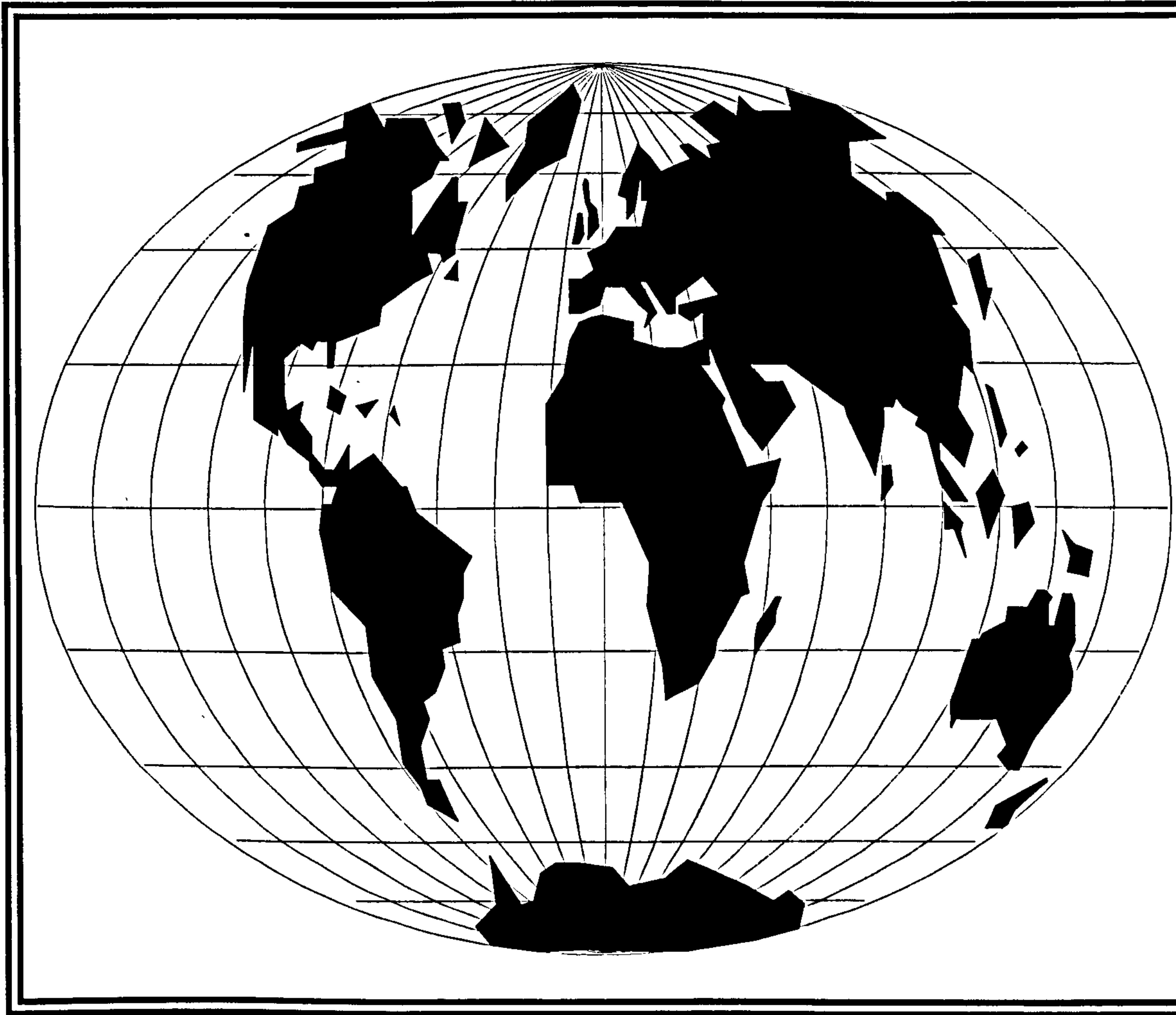
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RE-CONFIGURING AN INTERNATIONAL PHARMA-CHEMICAL CUSTOMER SERVICES POLICY THROUGH THE DELPHI TECHNIQUE AND PROCESS MAPPING

The Executive Summary



DOUGLAS BOATENG©

**RE-CONFIGURING AN INTERNATIONAL
PHARMA-CHEMICAL CUSTOMER SERVICES
POLICY THROUGH THE DELPHI TECHNIQUE
AND PROCESS MAPPING**

Executive Summary

By

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A Dissertation

**Submitted to
University of Warwick
In partial fulfillment of the requirements for the degree of**

**Engineering Doctorate
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Synopsis

As part of the organisation's strategy to improve its manufacturing logistics and supply chain management operations, they sponsored me on a Doctoral Program to research into the concept of customer service within the international Pharma-chemical and Pharmaceutical manufacturing industry. The research was structured in such a way that it formed part of my day to day manufacturing logistics assignments on and off site.

The ideas cultured through the research have resulted in unprecedented improvements in both material and information flows on and off site. In particular, the systematic solicitation of our customer views through the *Delphi technique* has enabled the firm to gain a better understanding of its customer needs. Today, customer service performance as defined by our Pharmaceutical customers averages 98%.

Nor is this all, for the continuous critiquing of various process steps through the *virtuous circle of continuous improvement* has enabled the organisation to improve the overall process lead times for two products by approximately 35%. With these improvements, all customers (internal or external) get what they want on time, in full and at the right quality.

By gaining a better understanding of our customer and supplier needs, through timely information flows, the manufacturing strategy for two products have moved from *make-to-stock* to *make to order*. To date, over £1/2m savings have been realised by virtue of the fact that no *raw material* or *finished product* inventory is held for these two finished products.

At the *back end* of Pharmaceutical supply chains, the survey on sourcing patterns within the industry showed that Pharma-chemical manufacturing was still concentrated among the major Pharmaceutical organisations. In fact, the study showed that Pharmaceutical organisations with sales of less than £900m outsourced their bulk Pharmaceutical needs whereas those having sales in excess of the stated amount used a combination of *internal* and *external* sources to satisfy their bulk Pharmaceutical needs.

At the *front end* of Pharmaceutical supply chains, the survey highlighted the fragmented nature of the industry with over 60% having sales of less than £500m. This finding supports the view held today that the industry is heavily fragmented with more consolidation likely.

The improvements to date have in fact exceeded what was expected. The gaining of approval to manufacture another product can be partly attributed to the continuous improvement efforts and accomplishments. With senior management's support, each individual and teams on site are continuously questioning their processes and seeking ways to reduce or eliminate the associated non value adding activities.

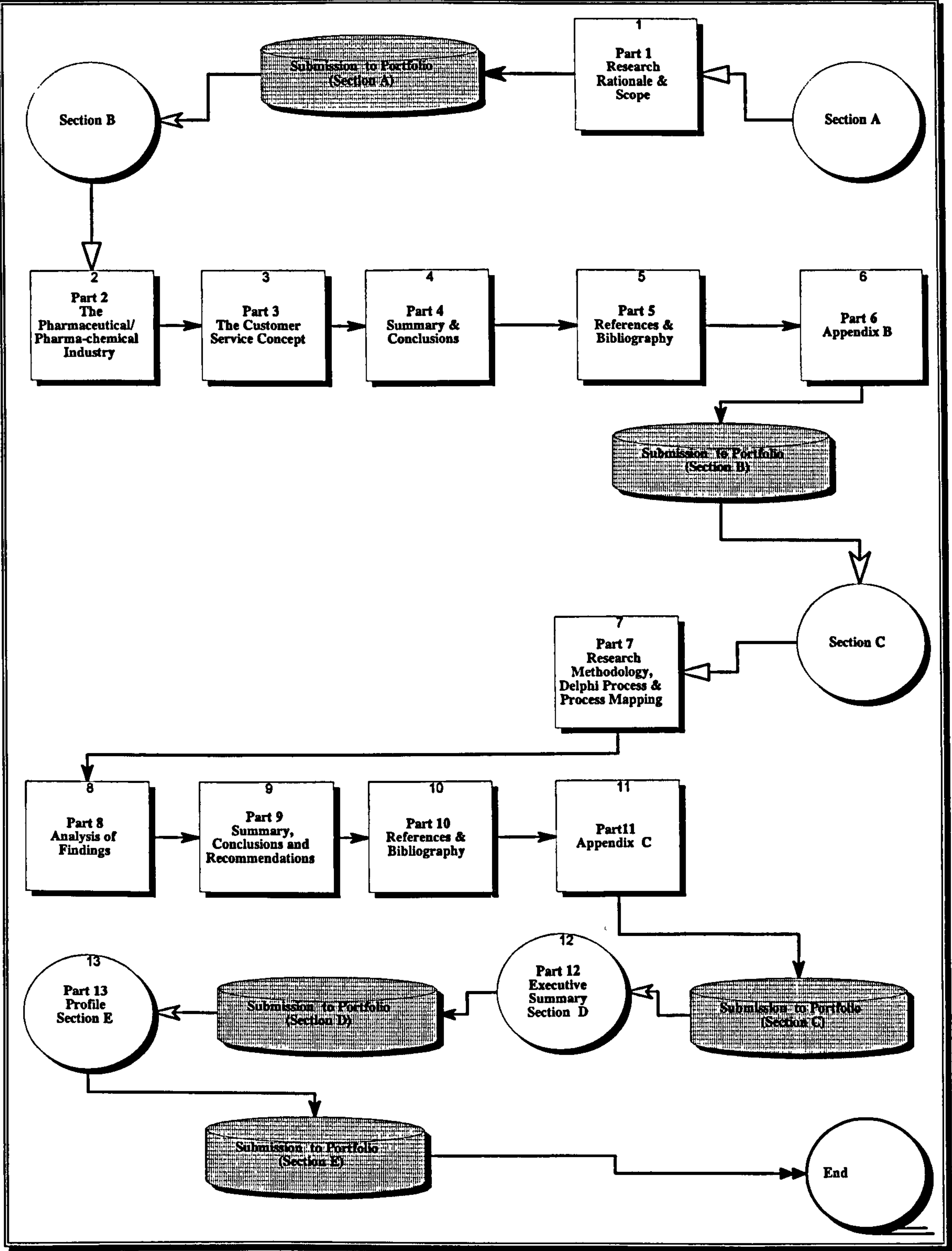


Figure 1 Executive summary's position on the Research Route Map.

About the Research Engineer:

The Research Engineer works full time for the Pharma-chemical division of a major International Pharmaceutical company, headquartered in the United States of America. The research was sponsored by the company.

Acknowledgments

Any major research in international manufacturing logistics and customer service is seldom the work of one individual. A number of persons within the organization, University of Warwick and Cranfield University have provided invaluable input. A number of people made helpful comments and provided verbal feedback for the final draft:- Mike Kingston, Ila. Shah, Diana Doran, Ruth Solly, Jan Atkinson, Mike Lewis, Joanna Dermott , Magdy Duran and Sue Loring.

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I am also indebted to our customers and members of the Delphi panel for their prompt responses during both the Survey and Delphi stages. Special thanks also to Mr. Robert Pike and Mr. Mike Kingston for thoroughly

reading the page proofs with me and the Global Supply Chain Team for making helpful suggestions.

The influence of my family especially Ernest and Cynthia, Edward and Rita played an important role in this dissertation as they have throughout my life. For their love, understanding, sacrifice, encouragement and patience, I am grateful. My parents and Grandmother have had a special impact on this study. Their working lives have been dedicated to the innovative implementation of customer focused systems. It is through their example that I have hopefully gained some insight into the strategic importance of customer service. To all these people, I am indeed grateful.

Financial support from my current company made this research possible.

As result of their support, the study evolved into one of the most comprehensive study on Pharma-chemical sourcing, the Pharmaceutical industry and international customer Service to date.

Words cannot really express Vivienne, Amma and Maame' contribution; their love, support, enthusiasm, understanding, sacrifice, and patience all come to mind, but none are adequate. Therefore I dedicate this dissertation to them!.

Declaration

This is to confirm that the information contained in the executive summary is the work of myself unless otherwise stated.

Douglas Boateng

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SECTION A

Research Rationale, Methodologies and Scope

Chapter 1.

Industry Overview

The Pharmaceutical industry is involved in the manufacture of human and animal health products primarily for their consumption. The industry developed in parallel to the progress and advances in taking care of the sick. Nowadays, so much importance is attached to the medicinal, chemical, biological and pharmacological research that before a drug makes it to the market, a organization would have invested a huge amount of capital. Pharmaceutical products are now only made available to the public in conformity with state drug laws, either through one of the health professionals-a physician, dentists or veterinarian-and dispensed by a Pharmacist¹.

The recognition that effective manufacturing logistics and customer service policies are the key to an organization's long term profitability and ultimate survival has brought with it an understanding of their strategic importance in the Pharma-chemical sector, a vital link in the Pharmaceutical supply chain². Around the developed world, the entire industry is going through unprecedented changes. Health care costs around the world are under pressure-even the formerly profligate United States of America is actively

¹ With the exception of the over-the-counter preparations.

² See Figure 2 for a schematic diagram of a Pharma-chemical /Pharmaceutical supply chain.

seeking ways to curtail their drug bill. As a result, the major players can no longer rely on finding instant markets for new products unless they offer demonstrable advantages over cheaper alternatives. Nor can they expect prices high enough to maintain the high margins enjoyed in the past. At the same time, the cost of discovering new drugs³ is soaring at an alarming rate.

The greatest pressure has come from the need to control spiraling drug bills. National governments and other agencies, which are the main customers of the Pharmaceutical industry, are looking for ways to stem the growth of health care costs. This puts enormous pressures on the manufacturing sector of the industry and has led to its complete metamorphosis. Although the industry is fighting back by pointing out that effective drugs which keep people out of hospital are highly cost effective, Pharmaceutical manufacturers are nonetheless facing more difficult times than before⁴.

Since the early nineties, the sales of many Pharmaceutical firms have been depressed by a series of health care reforms that are either planned or about to be implemented in some of the world's biggest markets for curative products: United States, France⁵ Germany, Japan and United Kingdom⁶.

³ Discovered drugs are usually given two names by the discovering company:- An approved or a brand name. For example Panadol is the brand name for Paracetamol whilst Nurofen is the brand name for Ibuprofen. Discovered drugs are patented by the manufacturer so that other companies may not copy the product. After patent expiration, other drug companies may produce their own generic versions of the medicine. Generic medicines are simply different versions of the brand drug. They are usually less expensive and contain the same active ingredient.

⁴ See Boateng(1996)² pp. 3-60 for more details on the changes currently sweeping the industry.

⁵ See Pharmaceutical Business News 12th July 1996 pp. 7.

⁶ See Financial Times March 1993& 27th September 1994.

Germany, one of the world's biggest markets for pharmaceutical products has cut its drug spending since the beginning of 1993. Similarly the United Kingdom, Italy, France Sweden, Netherlands, Spain, and Belgium⁷ are all getting serious about stemming the growth in their drug bill. The dramatic changes in fortunes have all come about by the rising health care costs faced by all countries. Recent figures from the OECD indicate that spending on Pharmacy drugs has increased in all the industrialized countries with Italy showing the biggest jump⁸. In real terms, the UK's expenditure on health care has more than trebled over the same period⁹. Some reasons cited by leading researchers and publishers¹⁰ for this rapid rise in cost include:-

- 1) The pace of technological innovation,
- 2) Demographic trends in most countries,
- 3) Increased life expectancy,
- 4) Changes in living conditions,
- 5) Stress,
- 6) Pollution, and
- 7) Unemployment.

Increasingly, the Pharmaceutical industry is realizing that in many of its markets, there is a trend towards a decline in the strength of the brand

⁷ See Moore(1996).

⁸ Ibid.

⁹ Ibid.

¹⁰ See for example Green(1994/6) and Moore(1996).

name and a consequent move towards cheap generic substitutes¹¹. Not surprisingly, the United Kingdom is not the only country urging medical practitioners to prescribe cheaper generic versions of the out of patent branded products¹². Quite simply, it is now becoming increasingly difficult to compete only on drug efficacy and corporate image.

As the industry's main customers have cottoned on to this important saving potential, firms are finding it increasingly difficult to sustain market share and maintain sales once a product has lost its patent protection. A classic example is SmithKline Beecham's Tagamet when it lost its patent protection. With patent expiration in May 1995, sales in the United States, the largest market for medicinal products, fell 82% in three months¹³.

Similarly Glaxo-Wellcome's Zantac lost almost 50% of its sales in Germany when it lost its patent protection ¹⁴.

To counteract such decline in fortunes, the industry is moving from a traditional strategy of corporate independence towards a collective strategy(vertical integration¹⁵, strategic alliances¹⁶ collaborative ventures¹⁷

¹¹ For example see Scrip Report No. 2044 21st July 1995 pp. 10 on Sandoz Pharmaceuticals and Pharmaceutical Business News Vol. 12 No 271 1996 on the French Government's move to encourage Generic Prescribing.

¹² Ibid.

¹³ See Green 1995 and Hamilton (1995), Scrip Report 2056/57 pp. 10,13.

¹⁴ See Price 1996.

¹⁵ Harrigan (1983) describes vertical Integration as a combination within a firm, functions that can be usually carried out by separate firms.

¹⁶ See Lubman and Langreth(1995).

¹⁷ Scrip Report No. 2044 pp. 10 -11.

and value-added partnerships¹⁸) in which entities recognize their dependence on each other¹⁹. In some cases, some firms like Glaxo, Merck, Bayer and American Home Products have entered into strategic alliances with leading over-the-counter and generic firms to directly market over-the-counter and generic versions of their out-of-patent products²⁰. Green(1995)^{a-d} neatly sums up the reasons for the shake up and alliances under two main headings:- .

I. Internal reasons

II. External reasons

Internal reasons

Within the Pharmaceutical industry, many of the drugs which were developed in the sixties had produced rapid growth and were nearing the end of their patent protection period. This in effect meant loss of market share and most of the major Pharmaceutical firms were likely to be affected. They include Glaxo, Wellcome, Marion Dow, Syntex, SmithKline Beecham, Ciba Geigy, Merck & Co., Bristol Mayers and Squibb, Roche, and Pfizer²¹. There is thus the need to find ways of protecting not only market share, but also profits.

¹⁸Laming (1993) describes value added partnerships as being a form of relationship where trading partners work in concert for mutual benefit.

¹⁹ See Financial Times 1994 & 1993.

²⁰ See Scrip Reports No. 2044, 21st July 1995 pp. 23; Report No. 2058 pp. 7.

²¹ Green(1995)^{a-e}.

External Reasons

The planned introduction of health care reforms particularly in the United States is bound to eat into the profit margins of the major Pharmaceutical firms. Nor is this all, for most industrialized countries are seriously seeking means to curtail their rising health care bills. To protect market share and profits, Pharmaceutical manufacturers are strategically protecting themselves through acquisition²².

Such manoeuvres have enabled manufacturers to bypass such powerful buyers like Health Managed Organizations(HMO) to directly market their products to the consumer. It is therefore not surprising that between 1989 and 1995, Lilly²³, Merck & Company, SmithKline Beecham, to name but a few, decided to form strategic alliances with a number of companies to market and develop over-the-counter and generic versions of their out-of-patent pharmaceutical products.

These developments have forced many managers and senior executives within the industry to recognize international customer service and manufacturing logistics systems within the Pharmaceutical/Pharmaceutical continuum as a weapon for competitive advantage.

The decision to become more customer focused to

1) Reduce response times to the market,

²² Green(1995) op. cit.

²³ See Burton(1995).

- 2) Improve delivery reliability within its product supply chains,
- 3) Reduce inventories in their product pipelines,
- 4) Add value faster than cost,

is clearly having an impact on how customer service is perceived. Both by early involvement in research and production process and by electronic data interchange, Pharma-chemical firms are increasingly being integrated with their Pharmaceutical customers. Some customer service re-engineering efforts in the industry have allowed some Pharma-chemical firms to:-

- 1) Cut the lead time to their Pharmaceutical customers,
- 2) Improve delivery reliability²⁴
- 3) Reduce inventories.²⁵
- 4) Reduce complexities and,
- 5) Be more flexible to respond to market changes whilst at the same time improving their operational efficiencies.

Today, the need for optimum customer service performance as a means to streamline product supply chains has never been greater. Yet, the customer service function, in most cases, was a neglected component of many supply chain re-engineering efforts with its level of performance normally based on industry norms, management efforts, past practices and in some cases a total dis-regard for what the customer wanted in terms of performance.

Today, customer values are being reshaped by national governments clearly

²⁴ To Pharmaceutical manufacturing and distribution centres.

²⁵ Bulk active inventories.

driven by the need to reduce costs. Emphasis is now on improving an individual life at a reasonable cost. Current developments in Pharmaceutical markets indicate that consumers will increasingly have more choice in what products they buy. This in effect means that medicinal products will move from being product focused to a more information and customer service driven products.

For the various divisions of the organization especially Marketing, to compete successfully, the Manufacturing Division must have customer driven systems in place to pro-actively meet Marketing needs at a reasonable cost. Efficient and effective Customer service policies will immensely help the manufacturing division to support the Marketing organization outsmart the competition.

The Top 15 Pharmaceuticals World Wide, 1993/1994						
Rank	Previous	Company	Country	Pharma sales	% Change	% Pharma
	Yrs. Rank				on sales	Total sales
1	1	Merck &Co.	US	8774.6	6.8	83.6
2	2	Glaxo	UK	8484	6	100
3	3	BMS	US	6524	3.3	57.2
4	4	Hoechst	Ger	6010.4	-0.5	21.6
5	7	Roche	Sw	5285.6	7.9	54.6
6	6	SmithKline Beecham	UK	5231.3	2.6	57.7
7	11	Pfizer	US	5128.5	12.5	68.6
8	5	Ciba	Sw	5103.5	-1.7	33.3
9	8	Sandoz	Sw	4972.2	1.8	48.7
10	9	Bayer	Ger	4792.2	2.6	19.3
11	10	AHP	US	4774.6	4	57.5
12	12	Lilly	US	4759	4.9	73.3
13	13	Johnson& Johnson	US	4490	3.5	31.8
14	15	Abbott	US	4389	9	52.2
15	16	Takeda	Japan	4204.9	15.5	64.2

Table 1. Top 15 Pharmaceutical Companies in the World²⁶.

²⁶ Source:- Scrip Yearbook 1995 pp. 77.

Table 1 presents a summary of the top 15 Pharmaceutical firms in the world. The two biggest drugs companies in the world controlled only 12% of the market in 1993 and 1994, with Merck having a lead of \$290 million over Glaxo.²⁷ Bristol Mayers and Squibb and Hoechst had sales in excess of \$6 billion whilst Roche, SmithKline Beecham, Pfizer and Ciba Geigy recorded sales in excess of \$5 billion each²⁸. Sixty five percent of the world wide Pharmaceutical market is accounted for by the top fifty companies²⁹. It is however expected that the merger mania that has swept the industry will close the gap between the major industry players in the coming years.

Customer Service -A Definition

Customer service is basically consistently satisfying a customer defined need by working closely with service³⁰ providers. These service providers can be external or internal to the organization. In addition, the end product could be tangible or intangible. To Perreault et.al, it was a package of measurable activities which provided utility to customers. To Blanding(1974), customer service was the chain of sales satisfying activities which usually started with the order entry and ended with the delivery of the product to the customer. This definition is limited in scope in that

²⁷ Scrip Yearbook 1995 pp. 77-79, Scrip, Jan 16th 1996. Since Jan 1995 Glaxo' acquisition of the Wellcome Foundation has pushed it to the top of the Pharmaceutical league table. See also Cope(1995) and Cookson(1995) reports on the Pharmaceutical industry. In 1996 Merck was joint number one with Glaxo-Wellcome with Novartis in third position. In terms of Market Capitalization Merck is still the biggest Pharmaceutical company in the world.

²⁸ Scrip Yearbook 1995 pp. 77-79.

²⁹ Scrip Yearbook 1995 op.cit.

³⁰ For example freight forwarders.

customer service in today's business environment has been proved to transcend just the sales satisfying activities suggested by Blanding.

Lalonde and Zinser's(1976) described customer service as

“Those activities that occur at the interface between the customer and the co-operation which enhances or facilitate the sale and use of the corporation's product or services.”

In their study, they concluded that customer service was defined mostly in one of three ways:

- 1) As an activity that has to be managed e.g. invoicing and handling of customer complaints.
- 2) As a performance measure such as the ability to ship 95% of orders received complete within forty eight hours.
- 3) As an element in the total corporate philosophy rather than as an activity or a set of performance measures.³¹

To Tucker(1980&3), customer service was

“Generally presumed to be a means by which companies attempted to differentiate their product, keep customers loyal, increase sales and improve profits”.

Lalonde, Copper and Noordeweir(1988) described customer service as a process which took place between three parties- a buyer, a seller and a third party. During the process value was added to the product or service

³¹ See Lalonde and Zinser 1976 pp. 156-159.

exchanged. The value added during the transaction could be short term as a single transaction or longer term in a contractual relationship. The value added was also shared. Lancioni and Myroslaw(1989) affirmed that customer service included all those activities over and above the assembly and sale of merchandise that was necessary to attract and retain customers. In addition, it included such activities as prompt response to customer inquiries, complaints or providing information about shipment. To Kji(1989), customer service

“Encompassed all the activities used by a firm to win and retain customers.....In addition, they were characterized by inseparability intangibility and inability to be stored.....”

Kyi also emphasized the fact that customer service was not an inventoried item that could be called upon to rectify a situation. Getting it right the first time was therefore a necessity.

Lambert with Sharma(1990) and Stock(1993) viewed customer service as all the activities which put together as a package constituted what a customer would receive for a purchase.

To Livingstone(1992), customer service was more than just providing a product to a customer. Like some earlier researchers, she was also of the view that customer service was the ability to satisfy a customer need in a manner which guaranteed a repeat purchase. All these authors were able to show that an improved service can lead to:-

- 1) An increased repeat business from existing customers.
- 2) Increase profits,
- 3) Improved morale,
- 4) Development of a service culture,
- 5) Improved productivity and communication.

Wagner and La Garce(1981) also made the following assertions:-

- 1) The need for firms to redevelop and tailor customer service to their customer needs if competitive advantage was to be gained.
- 2) Service offered to customers must be continuously reviewed as an integral part a firm's strategy.

The definitions given so far are consistent with each other in that they view customer service as being provided by a supplier to a customer. Again, it requires that a customer service activity be managed to ensure that utilities are provided in a way required by the customer. With customer service being a non-price competitive strategy, there is the need to reshape the customer service mix as the ability to use price as a mechanism for maintaining market dominance is weakening. Although numerous studies and publications have been done in this area, there seems little consensus about the number and range of activities and attributes that make up international customer service³².

³² Boateng(1996)² pp. 64-123.

Customer Service and Pharma-chemical manufacturing

As already mentioned, a lot of sweeping changes coupled with generic substitution of branded products and the growth in over-the-counter sales have begun to significantly affect sales and profit margins enjoyed by the major players in the Pharmaceutical industry. Up until now, all that the Pharmaceutical and Pharma-chemical manufacturer needed to do was to keep churning out innovative products and use a huge sales force to ensure that their products were prescribed by Physicians³³. Current indications lead one to conclude that the industry's biggest customers, governments and health care buyers,³⁴ will drive the pace of change in the industry, resulting in a more dynamic and hostile environment than ever before. The changes currently sweeping the industry have forced all the leading Pharmaceutical manufacturers to adopt new strategies to compete and survive into the millennium.

The strategies adopted include the following:-

- 1) Organic growth through mergers and acquisitions,
- 2) Be more customer focused.
- 3) Scaling back through divestation to concentrate on core competencies and
- 4) Redefinition of roles in the industry by acquiring PBMs³⁵.

³³ Thanks to Mr Pike and Dr. Mendez for this assertion.

³⁴ The National Health Service (NHS) in the UK and Health Maintenance Organizations(HMO) in the USA.

³⁵ Pharmacy Benefit Management. These organizations basically buy medicinal products in bulk from the major Pharmaceutical companies on their customer behalf.

Government actions in terms of encouraging Generic substitution and OTC³⁶ buying of pharmaceutical products indicate consumers will have to take more responsibility for their health. To this end, perceived values will take on a new meaning in the industry.

For the Pharmaceutical manufacturer to be responsive to its front end customer needs, its bulk supplier³⁷ will in turn have to reconfigure its processes and systems to have a more customer focused operation.

From the Delphi exercise , it became clear that not only is the setting of a customer service policy an arduous task but also measuring the desired customer service attributes was practically impossible. Nor is this all, for the meaning of the term customer service and the significance attached to each of the variables were still highly situational.

Nowadays, there is no longer a concern over whether a service need will be satisfied but rather, what level of service is deemed most appropriate to help an organization sustain its competitive advantage. A bad service may be rectified after a complaint but the damage done might be irreparable. In a nutshell, customer service as a competitive tool can significantly affect an organization's standing in today's highly competitive Pharmaceutical industry.

³⁶ Over the counter.

³⁷ That is the Pharma-chemical manufacturer.

Chapter 2.

The Scope of the Research

Figure 2 illustrates the complexity of the manufacturing channel structure for a pharmaceutical product. The Pharma-chemical manufacturer produces and distributes the bulk active pharmaceutical product to either;-

- 1) A Generic Pharmaceutical manufacturer ,
- 2) Ethical Pharmaceutical manufacturer or
- 3) Over-the Counter Pharmaceutical manufacturer or,
- 4) To all three types of manufacturers.

Upon receipt of the bulk active, the Pharmaceutical manufacturer converts the bulk active into dosage form³⁸. The Pharmaceutical manufacturer then sells the products:-

- 1) Through its distribution channels³⁹ to the consumers e.g. Over-the-counter preparations or
- 2) Gets the product to the consumer through a prescription given by a qualified doctor e.g. prescription and generic drugs.

In most cases the Pharma-chemical manufacturer is a vertically integrated division of the Pharmaceutical organization⁴⁰. This research was restricted

³⁸ For example Capsules, tablets, liquid etc.

³⁹ Pharmacists.

⁴⁰ Size in terms of sales and ethical volumes play a key role in determining whether a pharmaceutical manufacturer makes or buys its bulk active pharmaceutical needs.

to the Pharma-chemical and Pharmaceutical continuum⁴¹ and excluded the consumer interface.

For the purposes of this research, customer service was viewed as the services or activities required by operational managers⁴² at Pharmaceutical manufacturing sites in addition to the “bulk actives⁴³” supplied by Pharma-chemical entities.

A Delphi exercise on International customer service was designed to elicit the customer service needs of the Pharmaceutical manufacturer and as a benchmark for appraising the impact of any changes on the local policy on International Customer service. The exercise was constructed in such a way that the customer service attributes perceived by Pharmaceutical customers to be significant could be systematically solicited and collated through the Delphi Technique⁴⁴ and used for configuring an International Customer Services Policy.

⁴¹Drug production is in two stages: the preparation of the physiologically active ingredients, and its conversion into dosage form. Throughout this study, the first stage will be referred to as Pharma-chemical or Bulk Pharmaceutical or primary production. The products made at the primary stage will be referred to as bulk actives. The latter will be referred to as Pharmaceutical or secondary production. The products made at the secondary stage will be referred to as formulated Ethical or prescription drugs. Ethical prescription drugs are pharmaceutical products that can only be obtained through a prescription from a medical doctor. over-the-counter drugs are products that can be obtained in any store or pharmacy.

⁴²Operational managers are those people in middle to top management positions in Purchasing, Materials management, Logistics and Customer service positions within the Pharmaceutical industry. Unless otherwise stated, the “customer” throughout this research is the Pharmaceutical manufacturer within the Pharma-chemical-Pharmaceutical distribution channel.

⁴³ Unlike other industries the quality of a pharmaceutical product is unquestionable.

⁴⁴ The Delphi Technique is basically a technique for systematically soliciting a consensus of opinion on an issue from a panel of experts.

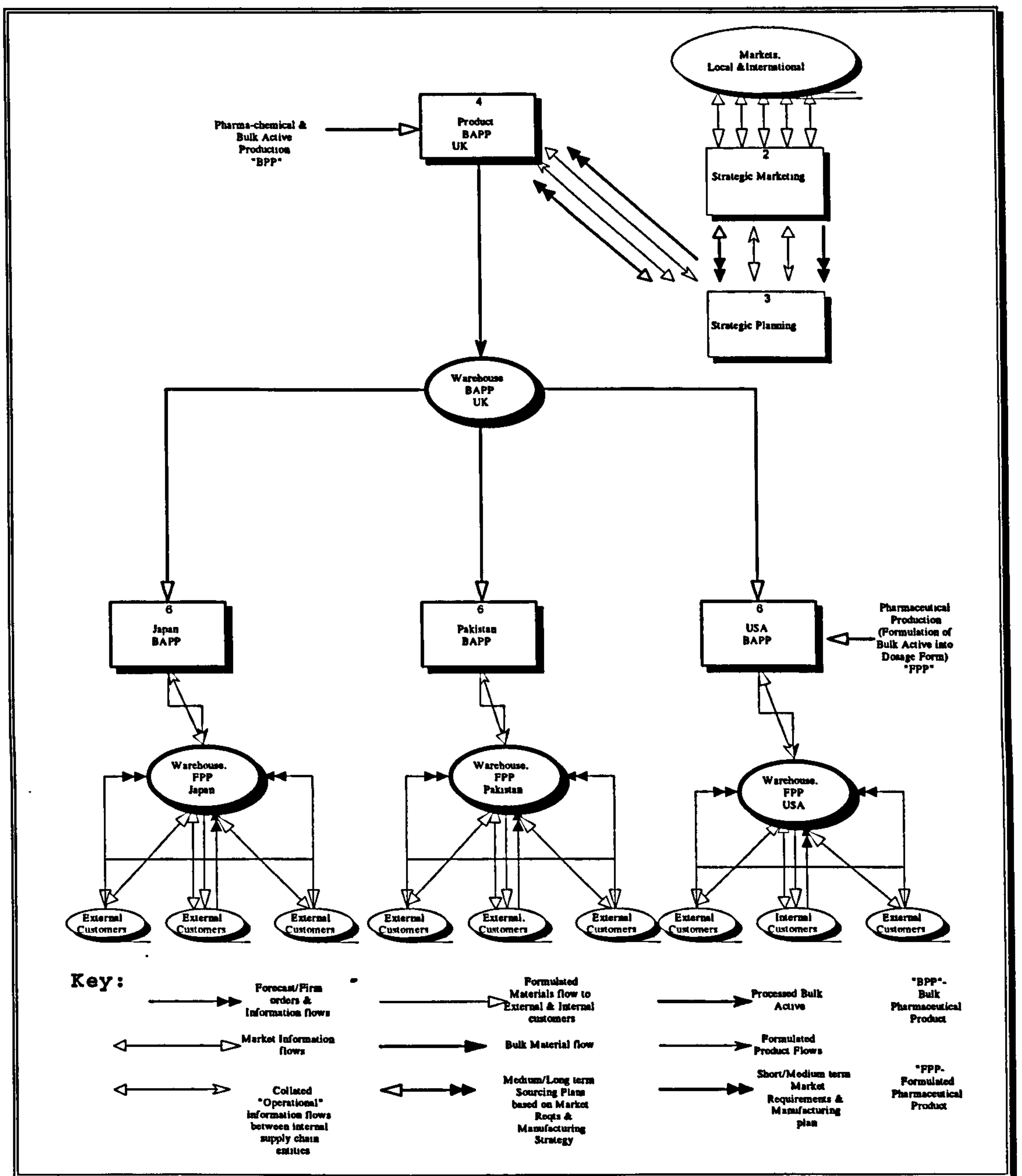


Figure 2-Pharma-chemical-Pharmaceutical supply chain

Overall Objectives of the Study.

The overall objectives of the study were to:-

- 1) Determine the sourcing strategies of the major Pharmaceutical manufactures.

- 2) Understand some of the factors that influenced the sourcing strategies of the major Pharmaceutical manufacturers.
- 3) Elicit a consensus of opinion on International Customer Service attributes and from it derive a generic policy that can be adopted by all Pharma-chemical manufacturing sites within the organization.
- 4) Determine the relevant attributes of international customer service from the perspective of the Pharmaceutical manufacturing entities and Strategic planning.
- 5) Ascertain the perceived significance of each customer service attribute from the Pharmaceutical manufacture's perspective.
- 6) Investigate how process mapping could be engaged to evaluate the various core processes associated with the customer service function and some products.

Research questions

Sourcing Patterns of the Major Pharmaceutical Manufactures.

- 1) What are the bulk sourcing strategies of the major pharmaceutical manufacturers.?
- 2) What determines whether the bulk active is sourced externally or internally?
- 3) What are the key criteria for successfully applying the survey method?

Customer Service

- 1) What are the customer service requirements of Pharmaceutical manufacturers?.

2) What customer service attributes are commonly perceived by the

Pharmaceutical manufacturer to be:-

☛ Extremely important?

☛ Important?

☛ Least Important ?

☛ Not Important?

3) What customer service benchmarks needs to be implemented ?

4) How do Pharmaceutical manufacturers rate the customer service

performance of their Pharma-chemical suppliers relative to best practices

against the following:-

☛ Excellent?

☛ Good ?

☛ Below Average?

☛ Poor?

5) For a step change in performance, what customer service metrics need to be implemented by Pharma-chemical sites?

6) What are the key criteria for successfully applying the Delphi Technique?

Process Mapping

1) What value will process mapping bring to the organization?

2) What steps are needed to conduct a full scale process mapping exercise?

3) What issues need to be addressed for a successful process mapping exercise ?

4) What are the key criteria for applying the process mapping concept?

SECTION B

Methodologies Engaged and Findings

Introduction.⁴⁵

The following methodologies were engaged for the various parts of the research.

- 1) To determine sourcing Pharmaceutical manufacturers the survey method was adopted for this purpose.
- 2) For eliciting the customer service variables, the Delphi technique was engaged.
- 3) Process mapping was adapted to systematically critique the sequence of steps associated with various customer service processes.

Data Collection.

Electronic mail and internet were used to collect the data from the panel of experts. For both the Delphi and survey, a personalized letter of introduction, why the study was important and an offer to provide the respondent with a summary was either posted or electronically sent to each participant.

Data Analysis

Utilized descriptive analysis which included measures of central tendencies and dispersion to describe the distribution of the responses in all sections of the research. A brief description of descriptive analysis is given below.

⁴⁵ For more details on the various research methodologies please refer to Boateng(1996)² pp. 30-46, and Boateng(1997)¹ pp. 1-40.

Descriptive analysis

This basically refers to the transformation of data from a population sample to make it more meaningful to all interested parties or individuals. In most research, making collected data meaningful through frequencies and percentage distributions might be good enough for the interested party to make their own judgments. Beyond this, one can go into more sophisticated analysis like hypothesis testing and associations between the various variables. Under descriptive statistics are frequencies, percentages, mode, median, tabulation, and cross tabulation.

Chapter 3.

The Survey Method and the Pharmaceutical industry.

Tull and Albaum(1973) described survey research as a means to get information from a sample of people by the use of questionnaires.

Hart(1987) cited four main reasons for the popularity of the survey research:-

- 1) Survey research provides the researcher with the means to gather both quantitative and qualitative data.
- 2) Lots of information can be collected from survey research.

Kerlinger's(1973) earlier book on behavioral science also made mention of this fact.

- 3) Postal surveys tend to be a less expensive option to telephone interviews.
- 4) Through survey research, a large audience can be reached.

Babie(1973) rightly pointed out that as a tool, the survey method was logical, deterministic, general, parsimonious and specific.

The survey method was engaged for the following reasons:-

- 1) Comprehensive- Appropriate to most types of research.
- 2) Customized-Easily customized to suite need.
- 3) Versatile-Very robust as a tool.
- 4) Flexible-Can be easily changed in the light of new information.
- 5) Efficient-Where there is a limited budget, it can be used to reach a wide population sample.

To ascertain Clingiroglu's(1975) assertion that size generally played a major role as to whether a Pharmaceutical manufacturer in-sourced or out-sourced its bulk actives, a survey was carried out to determine the sourcing strategies of the major Pharmaceutical manufacturers operating in and outside United Kingdom. The design was based on a very simple likert scale. Respondents were asked to give their estimates by ticking the appropriate box(es). The questionnaire was basically structured under four major questions:-

Questions 1&2 were used to:

- Identify the manufacturer,
- Type of products manufactured, and
- Percentage split among products if involved in the manufacture if different pharmaceuticals.

Questions 3&4 were used to establish the following:

- Whether or not the Pharmaceutical manufacturer had vertically integrated plants that manufactured the bulk active for the formulations⁴⁶ sites or
- Out-sourced the bulk actives.
- A combination of both internal and external sourcing.
- Percentage sourced from internal and external bulk manufacturers.

⁴⁶ Throughout this report formulation and Pharmaceutical sites will be used interchangeably. For the purpose of this research the two terms should be treated as being the same.

➤ Whether there is some form of strategic alliance if bulk actives were sourced externally⁴⁷ and .

➤ Estimated sales of each organization.

A total of one hundred sixty questionnaires were posted to

- 1) All the registered members of the Association of British Pharmaceutical manufacturers. Well over 90% of the top fifty biggest⁴⁸ Pharmaceutical companies in the world are registered members of this organization.
- 2) Customers and affiliates of the sponsoring organization located locally and internationally.

A response rate of fifty six percent was achieved. The internal response rate was over ninety eight percent. Participants in the survey included Managers, Directors and a Chief operating officer of a major organization. Over 65% of these individuals were in material logistics and corporate planning positions.

⁴⁷ For the purposes of this research strategic alliance and joint venture agreement are considered to be the same.

⁴⁸ In terms of world wide product sales.

Findings⁴⁹

THE PHARMA-CHEMICAL AND PHARMACEUTICAL INDUSTRY

Table 2 presents the distribution of sales among the respondents. Over 50% had sales below £300 million with approximately 11% having sales in excess of £4000 million. The distribution of the results provided further evidence to support the view that the industry was heavily fragmented.

Value	Value Label	Frequency	Percent	Valid Percent	Cum Percentage
x≤£50m	1	10	11%	11%	11%
£51-200m	2	20	22%	22%	33%
£201-350m	3	18	19.8%	19.8%	52.7%
£351–500m	4	7	7.7%	7.7%	60.4%
£501-650m	5	4	4.4%	4.4%	64.8%
£951-1100m	8	3	3.3%	3.3%	68.1%
£1100-2100	9	5	5.5%	5.5%	73.6%
£2101-3100m	10	9	9.9%	9.9%	83.5%
3101-4000	11	4	4.4%	4.4%	87.9%
£4001-5000m	12	4	4.4%	4.4%	92.3%
x≥£5001m	13	7	7.7%	7.7%	100%
Total		91	100%	100%	

Table 2- International Pharmaceutical Industry Breakdown by sales 1994.

Some industry experts including Green et.al and Nolf and Wimer(1997)

point out that the shake up of the industry is likely to continue into the next millennium.

⁴⁹ Please refer to Boateng(1996)² pp. 30-46 and appendix A1 for more details on statistical findings from the survey on the Pharmaceutical industry.

Table 3 provides a summary of the distribution of the responses in relation how bulk actives were sourced. Participants were asked to state whether their bulk active requirements were:-

- a) Internally sourced,
- b) Externally sourced or
- c) Internally and externally sourced.

Value	Expected Count	YES	NO	Row Total
x≤£50m	1	0	10	10 11%
£51-200m	2	0	20	20 22%
£201-350m	3	0	18	18 19.8%
£351–500m	4	0	7	7 7.7%
£501-650m	5	0	4	4 4.4%
£951-1100m	8	2	1	3 3.3%
£1100-2100	9	5	0	5 5.5%
£2101-3100m	10	8	1	9 9.9%
3101-4000	11	4	0	4 4.4%
£4001-5000m	12	3	1	4 4.4%
x≥£5001m	13	7	0	7 7.7%
Total		29 31.9%	62 68.1%	91 100%

Table 3-Cross tabulation of bulk sourcing patterns by sales.

As can be seen from the responses, size in terms of sales, is one of the factors that determine whether a Pharmaceutical manufacturer sourced its bulk actives from internal or external Pharma-chemical manufacturers. Over 60% of the Pharmaceutical manufacturers with sales of less than £900m indicated that they did not source their bulk actives from internal sources whereas over 25% of Pharmaceutical manufacturers with sales in excess of £900m used both internal and external entities to satisfy their bulk active needs. The findings support Cilingiroglu's(1975) assertion that the bigger a Pharmaceutical company, the likelihood of the organization having an internal Pharma-chemical manufacturing entity to satisfy its bulk actives. It also reaffirmed the view held today by many professionals that size in terms of sales played a major role as to whether Pharmaceutical manufacturer made or bought its bulk actives.

Key criteria for the successful application of the survey method

Experience has shown that in order to successfully apply the survey method to gain a better understanding of a subject or a problem, a number of issues need to be carefully considered. These include the following:-

1. Always use simple unambiguous questions to:-
 - Reduce the risk of partially completed questionnaire.
 - Mis-interpretation of questions.
 - Mis-understanding vis-à-vis the objective of the study.

2. Whenever possible, the questionnaire should be addressed to a particular person within an organization.
3. Questionnaires to non-English speaking countries should be in the local language.
4. To improve the response rate, a reminder must be sent to non respondents, as soon as possible.
5. Use phrases and words that can be easily understood by the respondents.

Chapter 4.

The Delphi Technique and International Customer Service⁵⁰.

The Delphi Technique is a method for systematically educating expert⁵¹ opinions, knowledge and judgments on a complex problem⁵². The Delphi method was utilized to elicit the international customer service needs of the Pharmaceutical manufacturer because of the advantages it enjoys when attempting to arrive at a set of action plans particularly in relation to controversial and subjective issues⁵³. Besides, it allows one to generalize to a wider population with a high degree of confidence⁵⁴. In addition, the latter stages which involve a highly structured questionnaire to gather data in a form that is quantitatively analyzable is easily replicable and reliable. As a method, for consulting expert opinion, the Delphi Technique has over the years gained acceptance.

Originally, it was primarily developed and used for long range forecasting in technological organizations. Although still used widely for such purposes, its application has spread to the following:-

a) Educational policy research⁵⁵.

⁵⁰ For more details on the Delphi technique, and Customer service please refer to Boateng(1996)¹ pp. 25-46 Boateng(1996)² pp. 64-123 and Boateng(1997)¹ pp. 13-27, 41-106 respectively.

⁵¹ An Expert in this context is an individual in a relevant position and with the relevant background or professional experience to positively contribute to the problem resolution.

⁵² Moore(1987) pp. 50-1.

⁵³ Boateng(1996)¹ pp. 25-38.

⁵⁴ Udinsky, Osterlind and Lynch(1981) Dajani Sincoff and Talley(1979) Samuel (1986).

⁵⁵ Linstone and Turoff(1975).

- b) Entrepreneurship⁵⁶.
- c) Chemical industry⁵⁷.
- d) Health care planning⁵⁸.
- e) Productivity Improvement⁵⁹..
- f) Gathering information for Information system design⁶⁰.
- g) Social policy Implementation⁶¹.

Its widespread use has resulted in many variations. Nonetheless, the technique has not lost many of its original formats. Moore(1987) categorized the application of the Delphi Technique under six main groupings:-

- a) Identification of goals and objectives.
- b) Arraying possible alternatives.
- c) Establishing priorities.
- d) Revealing group values.
- e) Gathering information and
- f) Educating a respondent group.

Dijk(1989) also professed that the Delphi technique could be used in generating an understanding on an issue.

⁵⁶ Gartner(1990).

⁵⁷ Estes and Kuesport(1976).

⁵⁸ Schoeman and Majahan(1977).

⁵⁹ Sahu and Pradip(1989).

⁶⁰ Perez and Schuler(1982).

⁶¹ Buck, Gross, Hakim and Weiblat(1993).

As can be seen from the list, the Delphi technique is suited to a whole host of inquiries. It is suited to problems that involve a mixture of scientific evidence and statistical information. As a research tool, it offers the flexibility, scientific rigor, validity, and purposiveness, which can sometimes be difficult to attain with other research methods. As Linstone(1975) pointed out, if a problem did not lend itself to precise analytical techniques, it could benefit from Delphi. With advancements in technology, it is expected that the use of Delphi will expand even further as researchers learn about the benefits of its use.

Characteristics of the Delphi Technique

As explained in volumes 2&4⁶², the Delphi Technique has the following characteristics:-Anonymity, multiple iteration, feedback and convergence of distribution answers and a statistical group response. This is what makes this process unique among other research tools.

Delphi Accuracy and Reliability

Delphi accuracy has been successfully put to rigorous testing by various authors including Wouldenberg(1991), Campbell(1966) and Riggs(1983). As Martino et.al pointed out, questioning Delphi accuracy was not the prime issue. Rather, a researcher must seek to find out whether it captures the view of the carefully assembled panel of experts. Despite the fact that over the years the Delphi technique has been used in a variety of situations

⁶² Boateng(1996/7)¹

resulting in a number versions, it has retained its basic form as popularized by Dalky and Helmers(1963).

Delphi and Customer Service.

In previous volumes⁶³, the principles underlying the customer service concept as postulated by various authors including Lalonde and Zinser(1976) Lambert and Stock(1993) Roscitt(1990), Levy(1981),and Gearson(1993) were critiqued. From the review of the literature and various publications, it became obvious a lot had been written on the concept with various authors providing steps to achieve world class customer service performance. Lambert and Stock(1993) for example, provided a four step process for achieving the desired level of customer service. This involved an external audit, an internal audit, identification of solutions and establishment of levels. Shycon(1989) similarly recommended an external audit to understand the needs of the customer. Copper, Lalonde and Noordeweir's(1988) normative model developed in association with the Council of Logistics Management employs fewer customer service elements but unfortunately requires substantial statistical input, time and effort which makes it unsuitable for immediate policy analysis and decisions. Roscitt(1990) and Stern and Sturdivant(1987) also provided invaluable insights into customer service management. Unfortunately, they did not provide a formal way for analyzing and implementing their postulations.

⁶³ Boateng(1996)¹ pp. 5-11 and Boateng(1996)² pp. 64-123.

Lambert and Stock's model for improving customer service although comparatively more simplistic also requires significant statistical analysis, time and effort and significant amount of data input. The level of sophistication across industries tends to vary and any model on improving customer service must take this into account. Increasingly, Logisticians are realizing that many facets or dimensions of customer service such as information exchange, delivery reliability and, after sales service are addressed in so many different ways. To this end, there is the need to seek the views of the customer any time a customer service policy is being evaluated.

Reasons for Engaging the Delphi Technique.

In volumes 2,3&4, the advantages of engaging the Delphi technique to arrive at a set of action plans particularly in relation to controversial and subjective issues were well documented⁶⁴. The Delphi technique was engaged because of the following:-

- 1) Virtual elimination of bias of an individual in assessing the importance of any of the customer service attributes. The elimination of this bias helped develop a common Customer Service Logistics theme.

- 2) As already mentioned, customer service is defined in so many ways .

The utilization of the Delphi Technique helped alleviate some of the

⁶⁴ For more details see Boateng(1996)¹&2 and Boateng(1997)¹.

prevailing confusions regarding the distinctions(if any) between local and international customer service.

- 3) Though various attempts have been made by various academics and consultants to measure and define customer service on a number of variables, many of the measures are largely dependent on organizational preference. Thus any measure an organization chooses does not necessarily ensure that the needs of their customers are satisfied. The application of the Delphi technique to directly seek the views of the Pharmaceutical customer was thus deemed appropriate.
- 4) Currently, there is an absence of a simple but detailed methodology for eliciting a consensus on international customer service attributes.
- 5) The application of the Delphi technique was more likely to provide sufficient information on policy issues relating to customer service.
- 6) Although there have been numerous studies on the importance of optimum customer service performance, the priority to be attached to any of the attributes in an organization is still highly dependent on what value an organization or individual attaches to its importance.
- 7) As international logistics customer service cuts across various organizational and national boundaries ,(and no Policy currently exists within the organization), measuring the Pharma-chemical customer service performances are currently very difficult if not impossible. This is primarily due to the fact that organizations have

different measures as to how good or bad the quality of the customer service is.

Though the Delphi technique has been primarily used in technological forecasting, Pradip and Sahu(1989) successfully applied it in developing productivity measures. Its scope thus lies in applying the technique to other aspects and problems such as eliciting a consensus on International Customer Service.

The Delphi Team.

The team was made up of people in some of the following positions.

- 1) Director of World wide Pharma-chemical Planning.
- 2) Supply Chain Managers for products with world wide sales of between \$10 and \$1000 million.
- 3) Director of Logistics(NAFTA Region).
- 4) Director of World wide Product Supply Planning.
- 5) Director of Operations South America
- 6) Director of Operations China.
- 7) Director of Operations Japan.
- 8) Director of Product Supply Europe.
- 9) Director of Planning Europe.
- 10)Materials Managers⁶⁵
- 11)Logistics Managers⁶⁶

⁶⁵ Were randomly picked from various locations around the world.

⁶⁶ Ditto.

12) Director of Logistics Planning and Support.

13) Pharmaceutical/Pharma-chemical plant Managers.

Why these People on the Panel.

These people were selected on the following grounds:-

- a) They had the broadest knowledge about their customer service requirements and
- b) Were familiar with the current performance level being achieved by their Pharma-chemical suppliers.

In addition, not only did they know what direction they wanted customer service to take, but were also most likely to offer breakthrough ideas to help Pharma-chemical manufacturing sites become more responsive to their customer needs.

Location of Participating Organizations.

Included in this study were both independent firms⁶⁷ and vertically integrated divisions of the multi-national⁶⁸ sponsoring organization, both domestic and foreign, operating in and outside the United Kingdom.

Locations of the Pharmaceutical manufacturing sites included South Africa, Morocco, Lebanon, Turkey, United States(3 sites), Canada, Brazil, Mexico, Puerto Rico, Venezuela, Costa Rica, Australia, China Korea Taiwan, Japan, Holland, United Kingdom, France, Germany, Ecuador, Portugal, New Zealand ,Sweden and Argentina. Pharma-chemical site

⁶⁷ Independent firms with some business connection with the sponsoring organization.

locations included Ireland, United Kingdom, United States(3 sites), and Puerto Rico.

⁶⁸Hood and Young (1979) define a multi-national enterprise as a corporation which owns (in whole or in part), controls and manages income generating assets in more than one country.

The Delphi Process

Figure 3 presents a schematic diagram of the Delphi process. Following is a brief description of each stage.

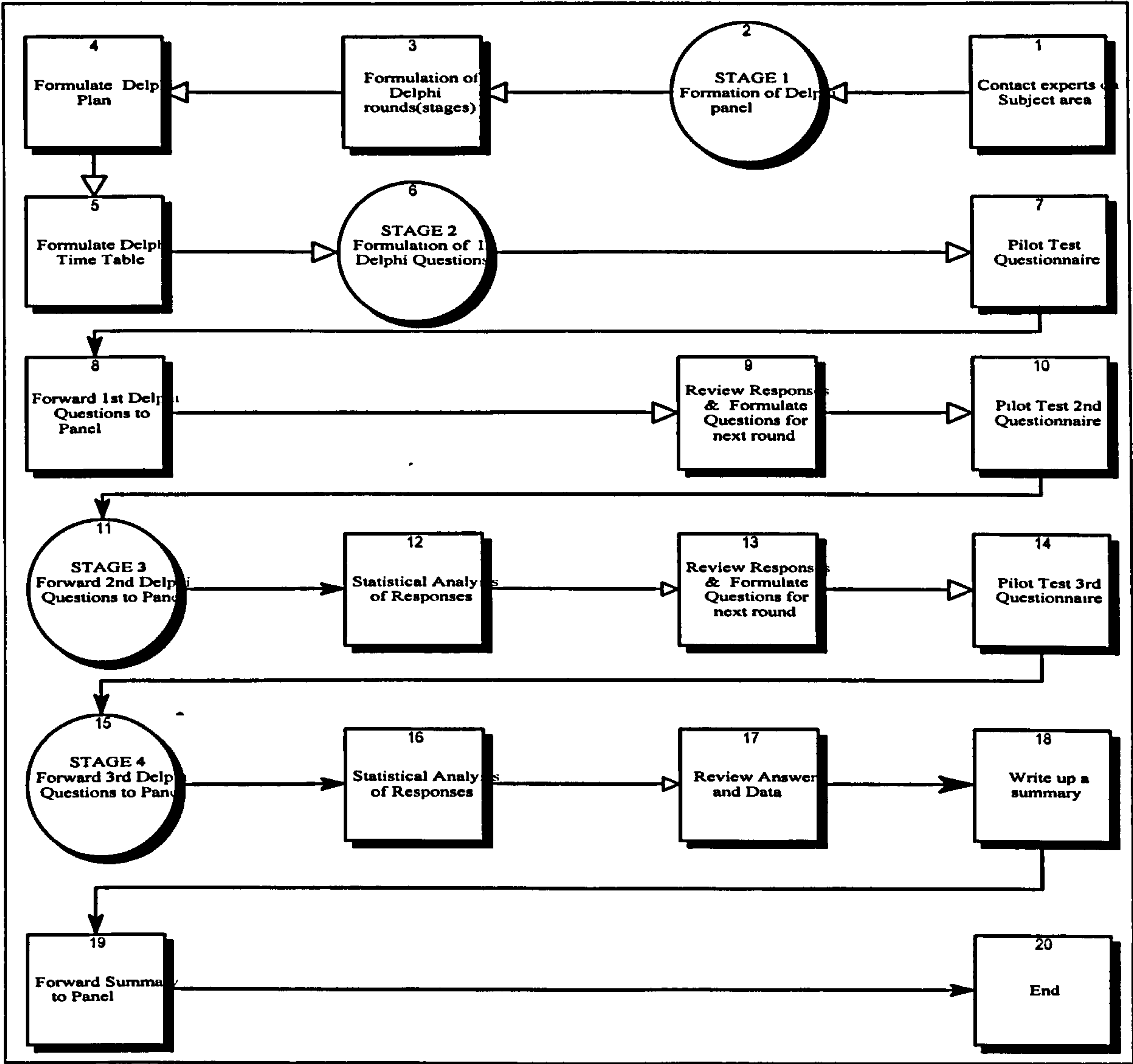


Figure 3-The Stages of Delphi Exercise.

Stage 1

Selection of the Panel of Experts.

This stage involved the selection of specialists whose judgments on International Customer Service attributes were elicited. In all, fifty five panelists located in over twenty countries were chosen.

In carrying out the survey exercise in section B⁶⁹ a number of relevant contacts whose background and experience were to later prove invaluable to the exercise were made. After contacting the ones in middle to senior level management ten agreed to take part in the study with the understanding that:-

- a) They will remain anonymous with confidentiality guaranteed.
- b) All the results will be made known to them.
- c) They will participate in some future studies originating from their respective organizations.

⁶⁹ Boateng(1996)¹ pp. 30-46.

The fifty five people were made of the following:

Relationship	Number	Position	Percentage
External Experts	10	Senior executive and Directors	18%
Internal Experts	22	Senior executive and Directors	40%
Experts from Strategic alliance /partners	15	Senior managers and managers	27.27%
Other	8	From Finance; Marketing; Research, Vice Presidents and other	14.54%
Total	55		100%

Table 4-The Make-up of the Panelists

Well over fifty percent of the external experts were located in Europe. As per the internal experts and those coming from entities with which the sponsoring organization had strategic alliances, they were chosen in consultation with our major customers and senior personnel within the organization. Over ninety percent of the internal experts were also located outside Europe. Their backgrounds and professional experience to date played a key role in their selection.

Stage 2

Formulation of the Delphi Questions and Distribution to Panelists

This step included asking broad open ended questions about international customer service attributes. At this stage, one was seeking to elicit some broad definitions of customer service from the respondents. The questionnaire was generally unstructured and open ended. The intention

was not to limit in any way, the range of answers from the experts. Open ended and broad questions offered the respondent maximum freedom to interpret the question. A response rate of 100% was achieved for this round.

Stage 3

Distribution of 2nd questions

Stage 3 entailed asking panel members to rank preliminary priorities among responses generated in stage 2. A response rate of 90% was achieved for this stage.

Stage 4

Distribution of 3rd questions

Panel members were asked to vote again on the items which were outside the normal distribution. A response rate of 90% was once again achieved for stage 4.

Definition of Value Labels

Against each label constructed on a likert type scale, panel members were asked to express a view on each statement against the following:-

Extremely important

These are attributes that significantly and positively impact customer service performance. An attribute that scores the most votes⁷⁰ against this

⁷⁰ The Mode.

label should be fully addressed and implemented within the *next three months*.

Important

These attributes affect customer service performance but benefits may not be realized immediately. Nonetheless, it should be implemented within the *next twelve months* as it will significantly contribute to the organization's continuous improvement initiative.

Least Important

These attributes will not impact customer service performance within the next twelve months. However, for continuous improvement purposes it is worth considering for long term initiatives.

Not important

With these attributes, the panelist did not foresee any quantifiable benefits to the organization.

None of the Options

Panelist was not in a position to make a judgment on the issue.

For the benchmarking purposes, the experts were asked to vote on the following:-

Excellent

Attribute that received an excellent rating by the panelist meant that performance was in line with world class practices. There was however the

need to continuously monitor the competition if world class performance is to be sustained.

Good

There was consistent performance with these attributes. However, when compared to world class practices, customer service performance was unsatisfactory. As such, significant improvements were needed to align processes to world class practices. It would be extremely useful to consider process mapping and benchmarking.

Below Average

There was inconsistent performance which was causing operational problems. Urgent attention was thus needed to improve performance.

Poor

Attribute needed immediate attention as poor performance was constantly causing operation problems and uncertainties.

Martino(1975) like Wouldenberg(1991) reported the reliability of the Delphi technique. He indicated that findings obtained through a Delphi study closely matched overall group perception. A number of leading researchers including Linstone and Turoff(1975) and Samuel(1986) drew similar conclusions except that they concluded that the size of the panel influenced the reliability of the findings. For each statement in rounds two and three the following was calculated using SPSS:-

- a) The mean.
- b) Mode.
- c) Median.
- d) Percentage and
- e) Frequency.⁷¹

Stage 5

Distribution of summary to Panel

The distribution of responses from stage 4 was accepted as the group's position. This represented the nearest thing to a consensus on International customer service attributes. It affirmed the spread of opinions and consensus answers and minority arguments in defense of deviant responses on customer service.

Findings⁷²

As already mentioned, fifty five panel members drawn from various professional backgrounds and located at various places around the globe were chosen at random to participate in the study.

The first questionnaire was open ended and panelists were asked to state the major issues affecting international customer service. Statements generated were then coded for the next round. The second questionnaire consisted of a hundred and fifty six questions summarised from the

⁷¹ More details of the definitions of these variables can be found in Boateng(1997)¹ pp. 1-41.

previous round. Panelists were asked to rate each statement on a likert scale ranging from extremely important to not important.

	Response rate	Extremely Important	Important	Least Important	Not Important	Attributes needing immediate attention
Round 1	100%	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Round 2	90%	45 ⁷³	43 ⁷⁴	12 ⁷⁵	5 ⁷⁶	18 ⁷⁷
Round 3	90%	44 ⁷⁸	40 ⁷⁹	-	-	17 ⁸⁰

Table 5-Response Rate-Customer Service Attributes

As regards current performance vis-à-vis certain customer service attributes, panelists were asked to rate the current performance of Pharma-chemical sites relative to the competition on a simple likert scale ranging from excellent to poor. A brief summary of the results are given in tables 5 and 6⁸¹.

Like stage 3, the panelists were asked to vote again on fifty six percent of the statements that received the most votes in stage 4. The average response rate for all three rounds was approximately *ninety three percent*.

⁷² More details on the Delphi Findings can be found in Boateng(1997)¹ pp. 42-106.

⁷³ Boateng(1997)¹ pp. 55-59.

⁷⁴ *ibid.* pp. 60-63.

⁷⁵ *ibid.* pp. 65.

⁷⁶ *ibid.* pp. 64.

⁷⁷ *ibid.* pp. 67 for some of the attributes.

⁷⁸ *ibid.* pp. 84.

⁷⁹ *ibid.* pp. 91.

⁸⁰ *ibid.* pp. 89.

⁸¹ See page pp. 56

Upon analysis of the responses obtained in stage 4, each panel member was sent a summary of how they voted in relation to each statement. In addition, the mode, median, mean values were also presented.

Forty four customer service statements received the most votes⁸² against the *extremely important* label. By definition, they needed consideration and addressing within the *next three months*. They included the following:-

☺ *Quality of product should always be within specification.*

☺ *There should be collaboration with Freight forwarders:-*

☒ *To improve transit times.*

☒ *To improve information systems.*

☺ *Freight forwarder must offer flexibility in:-*

☒ *Emergency shipments.*

☒ *Special shipments.*

☒ *Rescheduling and rerouting shipments.*

☺ *Freight forwarder must be able to :*

☒ *Provide a response on the location of a customer order.*

☒ *Prepare government export declarations.*

☒ *Adhere to specific shipping instructions.*

⁸² Mode.

☒ *Offer Certificate of origin on the shippers behalf.*

☒ *Provide rapid response to customer inquiries by the customer.*

☒ *Offer Ocean bill of lading on the shippers behalf.*

☺ *Freight forwarder must offer consistency in:-*

☒ *Quality management practices.*

☒ *Promised pick up dates.*

☒ *Delivery to customers.*

☒ *Overall transit times.*

☒ *Shipment tracing.*

☒ *Good housekeeping.*

☺ *Materials mgt. personnel must be consistent in providing quality customer service:-*

☒ *Promised delivery to the customer site should be as per the agreed date.*

☒ *Quantity shipped should always be as per advised.*

☒ *Customers should be informed of pick up dates from the shipping site.*

☺ *Sites in a channel of distribution must be encouraged to improve:-*

☒ *Raw material inventory turns.*

☒ *Finished goods inventory turns.*

☺ The organization should develop:-

☒ *Appropriate policies for managing supply chain as a single entity.*

☒ *Strategies for reducing overall supply chain cycle times.*

☺ *Joint problem solving must be encouraged between supply chain entities.*

☺ Pharma-chemical sites must:-

☒ *Provide accurate invoice at all times.*

☒ *Notify the customer of any shipping delays.*

☺ Pharmaceutical sites must be:-

☒ *Proactive to market sensitive inventory reductions.*

☒ *Responsive to unplanned demand and orders.*

☒ *Be able to forecast and commit to orders.*

☺ The following must be aligned:-

☒ *Pharma-chemical and Pharmaceutical manufacturing strategies*

☒ *Marketing and Distribution strategies.*

☺ *Sites within a product supply chain must work with one set of numbers.*

☺ *Supply chain forecast must be managed by an individual.*

☺ *To improve, sites must admit to errors.*

☺ *Public recognition must be given to sites that:-*

☑ *Constantly strive for continuous improvement.*

☑ *Hold minimum inventories.*

☺ *Sites must be encouraged to implement activity based costing.*

☺ *Cycle time reduction must part of:-*

☑ *Each distribution site's objectives.*

☑ *Each manufacturing site's objectives.*

The majority of the statements that received the highest frequency⁸³ in stage 3 against the *extremely important label* also received the most votes in stage 4. Some of the customer service attributes like product quality, responsiveness, and flexibility were consistent with earlier findings by leading customer service researchers including Lalonde and Zinser(1976), Lambert and Stock(1993) Sterling(1985) Levy(1978); Tucker(1983)⁸⁴.

Forty statements also received the most votes against the *important value label*. The panelists believed that although these statements impacted customer service performance, benefits may not be realized immediately.

⁸³ The mode

⁸⁴ For more details see Boateng(1996)^{1&2}

However, it must be addressed *within the next 6 to 12 months* as it could significantly contribute to the continuous improvement initiative. They included the following:-

☺ *Manufacturing sites must routinely share production schedule data*

☺ *Pharma-chemical sites must:-*

☒ *Always use specific freight forwarders and carriers.*

☒ *Offer flexibility in pack sizes.*

☒ *Provide shipping details prior to goods leaving site.*

☺ *Tracking of dispatched material must be a policy for all sites.*

☺ *A data base of transit times to all destinations must be compiled.*

☺ *Freight forwarder should be willing to configure policy to meet customer needs.*

☺ *The number of freight forwarders must be rationalized.*

☺ *The organization should actively work with Freight Forwarders to improve:-*

☒ *Overall freight costs.*

☒ *Transport costs.*

☒ *Handling costs at both ends.*

☒ *Administrative costs at both ends.*

☺ Freight forwarder must be able to offer:-

☒ *Different modal services.*

☒ *Local delivery service.*

☒ *Door to door service.*

☒ *Advance cargo space bookings.*

☒ *Consular documents in local languages to where goods are shipped.*

☒ *Expand or reduce service at no extra cost.*

☒ *Consistency in fast response to claims.*

☒ *A dock receipt on the shipper behalf.*

☒ *Electronic packing list to the customers.*

☒ *Sight and time drafts.*

☺ There should be:-

☒ *Common systems among manufacturing and receiving sites.*

☒ *Dedicated support services for users of all information systems.*

☺ *Less emphasis should placed on profit plan volumes.*

- ☺ *Pharma-chemical sites must be proactive to market sensitive inventory reductions.*
- ☺ *There should be full EDI between internal supply chains.*
- ☺ *Material flows between supply chains need to be simplified.*
- ☺ *Inbound JIT deliveries to sites from major supplier must be encouraged.*
- ☺ *There should be channel performance metrics.*
- ☺ *Sites must be encouraged to implement bar coding systems.*
- ☺ *Nominated world class sites must publish their achievements in the organization's newsletter.*
- ☺ *Entities must routinely benchmark itself against external world class operations.*
- ☺ *Entities should work together to improve product costs.*
- ☺ *Group leverage should be used to improve purchase costs.*

A number of customer service attributes including use of specific freight forwarders, joint efforts to improve freight costs, common systems among manufacturing sites received similar of votes in the previous round.

As regards performance, a number of customer service statements were considered needing immediate attention by Pharma-chemical sites. They included the following:-

- ☺ *The organization should implement electronic invoicing in all internal sites within the next 12 months.*
- ☺ *There should be a sales order management policy for all Pharma-chemical sites.*
- ☺ *The Pharma-chemical sales order management policy must be reviewed every year.*
- ☺ *Corporate Logistics must undertake customer satisfaction surveys every year.*
- ☺ *For continuous improvement purposes, the transit time data base must be reviewed twice a year.*
- ☺ Ideally all orders should be:-
 - ☑ *Shipped on the requested ship date.*
 - ☑ *Considered a hit if ship on the promised ship date.*
- ☺ Ideally all customer:-
 - ☑ *Orders should be confirmed within 2 days after receipt.*

☑ *Requests should be dealt within 2 days by the supplying site.*

☑ *Late orders should be communicated to the customer 15 days before shipment.*

☺ *CERTIFICATE OF ANALYSIS should accompany goods.*

☺ *For release pending material, CERTIFICATE OF ANALYSIS must be forwarded a day after order is shipped.*

Not only did the majority of experts express the need for customer surveys every year, they also wanted release pending information to be sent to the customer within a day. This was consistent with the voting pattern in the previous round.

For benchmarking purposes, the panelists were asked to expressed a view ranging from excellent to poor on a number of statements.

Table 6 provides a summary of how the panelists voted.

	Response rate	Excellent	Good	Below Average	Poor
Round 1	100%	Not applicable	Not applicable	Not applicable	Not applicable
Round 2	90%	-	17 ⁸⁵	12 ⁸⁶	1 ⁸⁷
Round 3	90%	1 ⁸⁸	16 ⁸⁹	10 ⁹⁰	1 ⁹¹

Table 6- Response Rate- Benchmarks

Performance against a number of these statements were considered to be good. They included the following:-

- ☺ *Pharma-Chemical sites routinely inform the customer of the packing list.*
- ☺ *Shipped orders routinely conform to product dating standards.*
- ☺ *Orders were routinely shipped with*

- ☑ *The correct CERTIFICATE OF ANALYSIS.*
- ☑ *Readable CERTIFICATE OF ANALYSIS.*
- ☑ *The right packaging.*
- ☑ *The correct invoice.*
- ☑ *The correct address and*

⁸⁵Boateng(1997)¹. pp. 77-78.

⁸⁶ ibid. pp. 75-76.

⁸⁷ ibid. pp. 79.

⁸⁸ ibid. pp. 102.

⁸⁹ ibid. pp. 95-96.

⁹⁰ ibid. pp. 97-98.

⁹¹ ibid. pp. 103.

☑ *Shipped in full.*

☺ *CERTIFICATE OF ANALYSIS were routinely sent to customer on time.*

☺ *In most cases Pharma-chemical sites were able to respond to unplanned demand.*

☺ *Sites generate a constructive working relationship with each other.*

Although performances against these statements were considered *satisfactory*, the panelists were at pains to stress that when compared to world class practices performance⁹², they left a lot to be desired. Significant improvements were thus needed. Based on the parameters set, the voting patterns were consistent with previous round.

The panelists considered the following performance *below average*.

They included the following:-

☹ Orders were not routinely:-

☒ *Shipped on time.*

☒ *Shipped as per the promised ship date.*

☹ Supply chain entities *did not routinely share production schedule information.*

☹ Pharma-chemical sites routinely:-

⁹² Various company names were solicited from panelists for benchmarking purposes.

☒ *Communicated late orders 5 working days before shipment⁹³.*

☒ *Did not acknowledge orders.*

☹ *Pharma-chemical sites did not offer flexibility in pack sizes⁹⁴.*

☹ *Sites were not knowledgeable about each other needs.*

☹ *Entities did not share ideas on how to reduce product costs.*

☹ *Current methods for raising of purchase orders were not in line with world class practices.*

☹ *Entities were not working together to improve overall cycle times.*

☹ *Current policy for ordering bulk did not serve supply chain needs.*

☹ *Customers were not routinely informed of pickup dates.*

With these statements, the panelists were of the view that inconsistent performance was currently being achieved by Pharma-chemical sites. This was thus causing operational problems and as such, urgent attention was needed. For example, not only did Pharma-chemical sites *not offer flexibility in pack sizes*, they *failed* in most cases to ship orders on the *promised ship date*. Panelists also emphasized the need to align the various attributes to world class practices through benchmarking.

⁹³ 15 days was the minimum time required to inform the customer of a possible late shipment.

⁹⁴ Problem primarily due to Hazardous nature of operations. In less hazardous environments subdividing specifically for a customer order is relatively easier.

Configuration of an International Customer Services Policy through the Delphi Findings

The main objective of this exercise was to elicit from panel members customer service elements that could form the basis for comprehensively configuring an International Customer Service Policy for the Pharma-chemical entities within the organization. This has been achieved since a policy has been developed and successfully implemented.

The questionnaire was designed in such a way that a measure of current Pharma-chemical customer service performances were elicited. Firstly, the measure gave a reference point for benchmarking purposes. It also revealed how Pharma-chemical entities were performing against the best supplier.

By requesting Pharmaceutical sites to rate Pharma-chemical sites on performance relative to the best supplier, the preferred dimension on performance provided a reference point for an improvement program.

Key Criteria for the Successful Application of the Delphi technique.

As already mentioned, the Delphi process is a systematic solicitation of expert opinion on a subjective and often contentious issue. Its successful application is largely dependent on a number of key things:-

- a) Selection of the panel of experts.
- b) Development of Delphi questions.
- c) Commitment of the expert to see the process through.
- d) Phrasing of the questions in the open ended round.
- e) Detailed plan of execution.

Selection of Panel experts

The experts whose views are being solicited constitute the Delphi panel. The following must be taken into account when assembling the experts. An expert should:-

- 1) Feel involved in the problem of concern.
- 2) Have some knowledge of the issue under investigation.
- 3) Be keen to take part in the study and be willing to see the process through.
- 4) See the benefits of the exercise and be willing to at least utilize some of the findings.
- 5) If possible panel members should be nominated by people interested in using the results for decision making or analysis.

Development of Delphi questions

This stage is equally important as the selection of the Delphi members as, should panel members misinterpret the questions, they will provide wrong answers or become totally disillusioned with the whole exercise. Ideally time must be spent with some of the policy makers to ascertain what information is required. To avoid ambiguities and vagueness, the *Delphi coordinator* should ask one of the *panelists* to thoroughly review the *questionnaire and its contents* before issuing it to the entire Delphi team.

Selection of sample size

The number of experts vary from study to study. However, in most cases up to twenty participants on a panel is considered ideal. As can be seen from this study, the more people are involved the more questions are generated for subsequent rounds.

Development of first Delphi questions

In most Delphi studies, the experts are initially asked to respond to broad open ended questions. Allowing the experts freedom confer the following advantages:-

- a) Adequate time for thinking and reflection.
- b) Avoidance of under focusing on a particular idea.
- c) Avoidance of competition, status, pressures and conformity issues.
- d) No dominance by an individual.
- e) Avoidance of choosing between ideas prematurely.
- f) Anonymity-Panelists are not known to each other. As such they can freely express their views.

With advancements in information technology, the Delphi process can be administered via the internet making it relatively faster than postal questionnaires.

In developing and sending the questionnaire via email or internet, caution must be taking to ensure that:-

- 1) The paper size for printing the questionnaire is set at the appropriate standard.

- 2) Both letter and questionnaire contain no technical errors.
- 3) Not too much detail should be put into the letter.
- 4) The letter must be addressed to each individual panel member.
- 5) Pilot run the questionnaire to ensure the instructions for sending it back via internet or email works.
- 6) Ensure that instructions to return questionnaire electronically contains no jargon that is likely to confuse the panel member.
- 7) Always put a timing on each round.
- 8) If less than 30% has responded within two days of receiving the questionnaire follow it up with a telephone or a reminder via email.
- 9) Always issue a brief summary to all members and possibly a presentation to senior executives within the organization after fifteen working days of completing the study and a detailed report soon thereafter.
- 10) Time must be spent in selecting the experts as the wrong expert can send the wrong response and skew the Delphi results.
- 11) Ensure that all experts selected are prepared to see the whole process through.
- 12) The panel must ideally represent a whole array of people so that all views can be captured. Delphi by nature, asks questions that are very subjective by nature and caution must be taken in selecting people to be on the panel.
- 13) Ensure that enough time is allowed to analyze the data for each stage.

- 14)Ensure that each panel member returns the questionnaire as soon as possible.
- 15)To avoid excessive amount of data analysis and coding restrict the number of panelists to twenty.
- 16)For the initial round, select panel members whose command of English language is good. For an international study, a researcher should ideally translate the questionnaire into the local language of each panel member.
- 17)Avoid asking too many questions as it could become a statistical nightmare!.
- 18)Tabulated results should be presented in a very simple way so as not to confuse the Policy maker.

Chapter 5. **Process Mapping⁹⁵.**

Often, process improvements and fast response between processes come from finding out and understanding what actually happens in practice.

Process Mapping is simply a method for describing in detail, the various steps involved in carrying out a function, be it a business process or otherwise. To Ansler, Busby and William's(1993) process mapping was

“A simple chain of activities that were executed to achieve a defined goal...

The goal could be the delivery of a product or a service”.

To Hunt(1996), process mapping was a means

“To describe the various steps involved in a business process”.

Morrow and Hazell(1992) were of a similar view except that they went further to postulate the various steps needed in a mapping exercise. As a tool, it helps to give a qualitative picture of activities, their relationships and where they occur. Hunt(1996) neatly categorized processes⁹⁶ under the following :-

Customer process

Normally received by an external customer.

⁹⁵ For more details please refer to Boateng(1997)¹ pp. 28-40.

⁹⁶ A process is a series of steps designed to produce a tangible or intangible product.

Administrative Process

Process normally carried out within an organization primarily to meet the needs of the internal or external customer.

Management processes

These are processes taking by management to support the various business processes.

Though primarily used in understanding the activities involved in delivering a product⁹⁷, process mapping has been successfully applied in:-

- 1) Time based analysis ⁹⁸,
- 2) Cycle time reduction⁹⁹,
- 3) Product costing,
- 4) New product introduction,
- 5) Decision support,
- 6) Time strategy analysis¹⁰⁰,
- 7) Manufacturing strategy evaluation¹⁰¹,
- 8) Marketing¹⁰²,

⁹⁷ Tangible or intangible.

⁹⁸ Beesley(1995).

⁹⁹ Meyer(1993).

¹⁰⁰ Stalk and Hout(1990).

¹⁰¹ Tunc(1993) and Ansler and Williams(1993).

¹⁰² Kotler(1995).

9) Customer service tracking¹⁰³,

10) Restructuring¹⁰⁴,

Today, process mapping has become one of the most talked about business tool in productivity improvement circles with its benefits transcending organizational boundaries. It was initially developed by General Electric as an integral part of its *world wide continuous improvement* initiative. Its use has gradually spread to other industries including Financial, Pharmaceutical and Grocery industries. As a tool, it can help an organization to:-

- 1) Gain a better understanding of a process,
- 2) Improve product development cycle times,
- 3) Reconfigure a whole process,
- 4) Eliminate non value adding activities,
- 5) Improve time to market,
- 6) Improve product and administrative costs,
- 7) Gain faster responses between processes,
- 8) Improve material and information flows within and outside the organization,

¹⁰³ Shapiro (1992).

¹⁰⁴ Barker(1993).

- 9) Gain a better understanding of the internal or external customer and
- 10) To outsmart the competition.

In their landmark publication, Stalk and Hout(1990) postulated that organizations that *systematically critiqued* their processes and looked at how much time was spent at each step were able to successfully compete using *time* as a product differentiating strategy. Typical examples include Japanese companies which to date, have *continuously* and *successfully* driven down their overall product development cycle times.

Inherent in each process step are three variables, i.e. Theoretical, Demonstrated and Actual lead-times. A brief explanation of each is given below.

Theoretical cycle time

The theoretical cycle time is basically the average cycle time achieved from process design. The lead-time achieved under a controlled environment contains virtually no delay. The theoretical cycle time for each core process was gathered in consultation with each process custodian and Technical Operations.

Demonstrated Lead-time

The demonstrated lead-time is the *best average* lead time achieved from past effected steps. Unlike the theoretical cycle time, the demonstrated lead-time contains some delay as there are variables outside the control of

the process custodian. For benchmarking purposes, the demonstrated lead-times for each core process changes over time and replaced with the best average actual lead time.

Actual lead-time.

The actual lead-time is the current lead-time being achieved within each core process. For benchmarking purposes, the best average of the actual lead time becomes the demonstrated lead-time for the next measuring period.

Non-value adding activity(NVA)

This is basically the delay within the processes. For improvement purposes it is compared with the demonstrated and theoretical lead times.

Velocity

This is the ratio of

- a) Actual lead time over Theoretical cycle time and
- b) Actual lead time over Demonstrated lead time.

Mean

The average of the data set.

Median

The middle number in the data set.

Minimum

The minimum number in the data set.

Maximum

The maximum number in the data set.

Standard Deviation

The distribution of the number around the mean.

Sum

The total cycle time achieved for a particular set of process steps.

Following the data collection exercise it become evident that the actual lead-times for each core processes associated with the customer service function and two major products were below the demonstrated lead times.

Findings

As already mentioned, improvements come from something as simple as *working together to find out what you are actually doing*. From analyzing the various core processes associated with the customer service function, it was notable that the current performance was well below the previously demonstrated lead times. Failure to continuously benchmark and seek ways to improve delivery lead-times between processes had resulted in manufacturing logistics uncertainties.

Core Process	Actual lead-times Days (AFTER) ¹⁰⁵	Demonstrated lead-times Days ¹⁰⁶	Actual lead times Days (BEFORE) ¹⁰⁷
Order preparation and Transmittal	2.13	2	8.5
Order receipt and entry	1.5	2	5.83
Order processing	1.5	1.5	3.67
Warehouse packaging and Picking	1.88	2	4.08
Invoice preparation	3.25	3	9.33
Transit time	2	2	6.67
Total	12.26	12.5	38.08

Table 7 Process lead times identified¹⁰⁸.

As can be seen from table 7, the actual lead times were well below the demonstrated lead time and failure to initiate the process would not have

¹⁰⁵ After the “*virtuous circle of continuous improvement*” was initiated.

¹⁰⁶ Best average.

¹⁰⁷ Before the “*virtuous circle of continuous improvement*” was initiated.

¹⁰⁸ Ibid. See appendix C4.

highlighted the problem. The customer order cycle which should have taken on average *twelve days* was in practice taking thirty *eight days*¹⁰⁹.

The process mapping technique was useful in this research in that it provided simple but useful protocol around which performance improvements were initiated. It appeared to minimize bias and some of the problems associated with performance improvement initiatives. In many cases, the process custodian provided ideas that were used to refine processes.

Process Mapping Objectives

The prime objectives of the process mapping exercise were to:-

- 1) Understand the processes supporting the customer service function,
- 2) Ascertain whether the lead times for each process step was as per the demonstrated lead times,
- 3) Find ways of improving the present lead times by reducing the delays within the processes.

As can be seen from table 7, the aims have been achieved.

Key Criteria for the Successful Application of the process mapping technique.

Experience has shown that there is a tendency for manufacturing organizations to quickly join any “*process improvement bandwagon*” hoping for a positive step change in processes and systems. The champions or coordinators of such initiatives do so more out of a desire for a *quick fix* than a better understanding of what the real issues and opportunities are. For

¹⁰⁹ Please refer to Appendix C4, C5 and C6 in Boateng(1997)¹ for more details.

the successful application of process mapping at other sites the following steps must be followed:-

1. Create management awareness.
 - a) Alert management of the benefits to be gained from process mapping.
 - b) Illustrate with current successful projects within and outside the organization.
2. Agree on a champion from senior management.
3. Activity mapping.
 - a) Identify the core process for each system, be they external or internal to the organization
 - b) Identify the internal customers for each core process or processes.
 - c) Identify the external customer for the finished product.
 - d) Carry out an activity mapping exercise to identify process steps in each core process.
 - e) Link all core processes in a linear fashion
4. The Cross functional team.
 - a) Encourage the formation of cross functional teams to oversee initiative.
 - b) Team should include process custodians.
 - c) Appoint a cross functional team coordinator.

5. Cross Functional task teams.

- a) Encourage members to form cross functional task teams.
- b) Train task team leaders to facilitate meetings.
- c) Show the team how to apply simple techniques like brainstorming and fish bone diagrams to generate ideas.
- d) Introduce the task teams to the process mapping concept through an example.
- e) Encourage task teams to appoint a team coordinator.

6. The task team should focus on:-

- a) Why the process step is needed.
- b) What causes the step to take place as often as it does.
- c) What the linkages between the processes are.
- d) Who and what triggers the process step.
- e) What the process step is dependent on.
- f) What information is needed to successfully carry out the process within the demonstrated lead times.
- g) Encouraging the team to gain a greater understanding of the problems and opportunities in each core process

7. Allocation of time

- a) Establish the unit of measurement:-
 - i) Days,
 - ii) Hours etc.

- b) Adopt one unit across the various steps in the core processes
 - i) Establish:-
 - a) The theoretical cycle time for each core process
 - b) The “best” Demonstrated Lead time for each core process,
 - c) Actual lead times with ongoing processes.
 - ii) Establish the time frame within which data will be statistically analyzed and presented to Management.
- 8. Determine the source of information e.g. meetings, management systems etc..
- 9. Identification and allocation of lead times.
 - a) For each core process, add together the number of hours or days in each core process step.
 - b) Finally add all the total lead times for each core process.
- 10. Flow chart the core process with time as the unit of measure.
 - a) Tabulate the collected data for each product in a spreadsheet work book. Ideally a worksheet should be designed for each product.
 - b) Graphically represent the following averages.
 - i) The Theoretical cycle time(TCT).
 - ii) Demonstrated lead time(DLT).
 - iii) Actual lead time(ALT).

11. Statistically analyze the mean, median and mode by comparing the TCT,DLT,ALT.
12. Critiquing of Activity steps.
 - a) Question each step in the core process.
 - b) Aim to continuously eliminate or to improve these process steps.
 - c) For each core process revise the DLT^s with the best average from the ALT^s.
 - d) For each core process use the revised DLT figure as a benchmark for the next analysis.
 - e) Establish quick hits for the next period.

General Points to Note

1. Ensure that team spirit is kept alive by **PUBLISHING ACHIEVEMENTS**.
2. Start with **EASY QUICK HITS**.
3. Never **BRUSH ASIDE** an idea from the task team.
4. The Project leader must be seen as been **NEUTRAL** and **IMPARTIAL** in the whole process.
5. Project leader must
 - a) **NOT BE TOO CRITICAL** of flaws in processes.
 - b) **NOT** be seen as undertaking a **FAULT FINDING** exercise.
 - c) Must be a **GOOD LISTENER**.
 - d) Encourage people to **SEEK WAYS** to improve their processes.

- e) **Ensure that initiative is not seen as a FINITE PROJECT or a number crunching exercise**
- 6. **Senior management must**
 - a) **GIVE THE TEAM THE SUPPORT needed e.g. training**
 - b) **CREATE an atmosphere conducive and congenial for team building and creativity.**
- 7. **Lead time reduction must**
 - a) **BE PART of the site's objectives.**
 - b) **Be seen as a NEVER ENDING CONTINUOUS IMPROVEMENT INITIATIVE**
- 8. **Continuously seek best practices from external organizations.**
- 9. **Always compare the DEMONSTRATED, and THEORETICAL times with the competition.**
- 10. **Lead times reduction is**
 - a) **About people WORKING TOGETHER towards a COMMON GOAL to STAY AHEAD OF THE COMPETITION**
 - b) **About TEAMWORK, GOOD COMMUNICATION etc.**
 - c) **Is a PULL rather than a PUSH driven system of CONTINUOUS improvement.**
- 11. **Each entity is a SUPPLIER and a CUSTOMER.**
- 12. **It is not about MANIPULATING numbers. Rather it is about ADDING value FASTER than COSTS.**
- 13. **It is not TOP DOWN driven.**
- 14. **It is about ENCOURAGING process custodians to come up with BEST alternatives for ACHIEVING a POSITIVE step change in a firm competitive position.**
- 15. **It helps to understand WHY things are done.**

16. With process mapping, always remember the KISS principle:-

KEEP

IT

SIMPLE

STUPID

Finally, always **MEASURE** what is **MEASURABLE**.

SECTION C

Summary, Analysis & Conclusions and Recommendations.

Chapter 6.

Summary

The purpose of this study was threefold:-

- a) To gain a better understanding of the sourcing strategies of
Pharmaceutical manufactures.**
- b) To elicit a consensus of opinion on what constitutes international
Pharma-chemical customer service.**
- c) Evaluate the current core processes supporting the customer service
function through process mapping.**

To do this, the following actions were undertaken:-

- 1) Reviewed the relevant literature on the Pharma-chemical and
Pharmaceutical industry.**
 - ➡ Undertook a comprehensive survey on the bulk sourcing strategies
of the major Pharmaceutical manufacturers operating in and
outside the United Kingdom.**
- 2) Reviewed the relevant literature on customer service in a distribution
channel,**
 - ➡ Successfully carried out a three stage Delphi exercise to
systematically solicit a consensus of opinion on international
customer service attributes.**

3) Reviewed the relevant literature on process mapping.

- Developed a technique for collecting and improving the various core processes vis-à-vis customer service and two major products.
- Successfully applied the process mapping technique to evaluate the customer order cycle of a number of products.

Analysis & Conclusions Drawn from the Pharmaceutical Industry

From reviewing the relevant literature and carrying out the survey on the Pharma-chemical/ Pharmaceutical industry, it become obvious that the era of stability was over. Generic substitution of branded products and the growth in over-the-counter sales will significantly affect market share and profit margins enjoyed in the past by the major players in the industry. Intrinsically, there is the need to become more customer focused to improve both material and information flows in the Pharma-chemical/Pharmaceutical pipeline. The industry's biggest customers; governments and health care buyers¹¹⁰ will drive the pace of change in the industry, resulting in a more dynamic and hostile environment than ever before. The changes currently sweeping the industry have forced the leading Pharmaceutical manufacturers to adopt new strategies to compete and survive into the millennium.

The strategies adopted include the following:-

- 1) Be more customer focused,

¹¹⁰ The National Health Service (NHS) in the UK and Health Maintenance Organizations(HMO) in the USA.

- 2) Scale back by selling non core activities.
- 3) Redefinition of roles in the industry by acquiring Pharmacy Benefit Management.
- 4) Effective manufacturing logistics and supply chain management policies.
- 5) Government actions in terms of encouraging Generic substitution and OTC buying of pharmaceutical products indicated that consumers will take more responsibility for their health. This in effect means perceived values and relative product efficacy will take on a new meaning in the industry. For the Pharmaceutical manufacturer to be responsive, Pharma-chemical manufacturers will in turn have to re configure their customer service activities as the intangibles associated with customer service between the two manufacturing entities increasingly become a weapon for competitive advantage.
- 6) The survey carried out on sourcing patterns of the major Pharmaceutical manufacturers indicated size in terms of sales played a major role in determining whether a Pharmaceutical manufacturer internally or externally sourced its bulk active needs. For example, the survey showed that no Pharmaceutical manufacturer with sales of less than £900 million had vertically integrated Pharma-chemical plants to satisfy its bulk active needs. With over 60% of the top Pharmaceutical organizations taking part in the survey, one can confidently conclude that Pharma-

chemical manufacturing is still generally an integral part of the manufacturing operations of the major Pharmaceutical organizations.

Analysis & Conclusions drawn from International Customer Service

From the review of extant literature on customer service, it became clear that not only is the setting of a customer service policy an arduous task but also measuring the various attributes were difficult if not impossible. Nor is this all, for the meaning of the term customer service and the significance attached to each of the attributes is still highly situational. As a result of the uncertainties within the industry, the role of manufacturing logistics and in particular, customer service between Pharma-chemical and Pharmaceutical continuum will increasingly become a weapon for competitive advantage. It is thus imperative for Pharma-chemical manufacturers to re-conceptualize customer service and give it the necessary focus it deserves. Increasingly, there is no longer a concern over whether a service need will be satisfied but rather, what level of service was deemed most appropriate to help an organization sustain its competitive advantage.

Within the current climate, Pharma-chemical manufacturers are beginning to seriously re-configure their strategic approaches to manufacturing logistics and supply chain management. Instead of just seeking cost reduction in manufacturing, customer service could form an integral part of the overall competitive strategy. To be successful, the adoption of proper

international customer service policies and standards will require a substantial paradigm shift in corporate thinking. Initial indications are that, partial implementation of customer focused systems can have a dramatic impact on a company's profitability and ultimate survival. Overall, it has the potential to spearhead the next major revolution in competitive practices within the industry.

One obvious issue that was re-emphasized through the study was the need for the customers' view to be represented if any meaningful and practical policy and standards were to be set.

As Lambert and Lewis(1983) and Barabba and Zaltman(1991) pointed out, it is imperative that an organization elicit the views of the customer to determine their reactions to various service policies in order to evaluate the associated costs and benefits. In addition, Bryant and Buffa(1981) reaffirmed the need for any customer service policy or standard to be measurable, competitive, achievable and more importantly aimed at satisfying the needs of the customer.

In a nutshell, it is extremely important for an organization to have a policy that advances its long range profit and return on investment. One should however note that the optimum service level is not always the lowest cost option but rather the level that provides the firm with the largest long range market penetration and profits.

Analysis & Conclusions about the Definition and Composition of International Customer Service

- 1) The methodologies used in this study recognised and took into consideration the various issues postulated by leading customer service researchers and writers. Previous research in this area was not able to conclusively establish the significant international customer service attributes. This research integrated the necessary procedures such as process mapping for the internal audit to also evaluate the supporting systems. It was also constructed so as to be transferable to other sites and even industries. Thus the methodology provided managers with a definitive and practical techniques for evaluating policies and processes. The overall methodologies engaged proved to be very effective in achieving the goals of the study as originally developed for evaluating and improving customer service performance within the Pharmaceutical and Pharmaceutical continuum.
- 2) The use of the Delphi technique allowed panel members to generate customer services statements and through a process of elimination voted on the issues they perceived as needing inclusion in the reconfiguring process. The Delphi study on international customer service has provided a list of attributes that can be added to the existing list on international customer service attributes. The most striking result was the amount of statements generated and perceived as being part of customer service. In all, a total of one hundred and fifty six statements were generated by

Pharmaceutical customers. It proved that customer service as postulated by writers including Marr(1980), Lambert and Stock(1993), and Wilson(1974) was multi-dimensional in nature and highly situational. Nor was this all, for its impact transcended functional, organisational and national boundaries. Because of its multi-disciplined nature, it was imperative that organisations seek their own solutions to bettering the customer service function. Within international supply chains the importance of understanding customers and their organisational cultures and personalities should always be an important consideration when looking at customer service within an entire supply chain. In some cases, it might not always be possible to offer similar service packages on a global basis. For example a firm with operations in USA ,Canada, UK, Mali, and Chad, must contend with transport and logistical problems in Mali and Chad. These problems can significantly impact customer service performance in these countries.

- 3) The main objective of the Delphi was to gain an overall understanding of what customer service issues were considered within the Pharmaceutical manufacturing continuum. Based on this, the sample size¹¹¹ for the study was kept to a size which could allow statistically viable customer service statements to be elicited from the panelists drawn from various backgrounds and countries. At this point, it was not deemed

¹¹¹ The panel was made up of fifty five professionals and managers from over twenty three countries. In a number of cases, there was only one individual representing a country.

necessary to demographically segment the customer service statements and attributes. Managerially useful segments of international customer service were thus not computed. Nor was this all for representatives¹¹² on the Delphi panel did not make it possible to identify any statistically significant differences between Pharma-chemical and Pharmaceutical perceptions on international customer service attributes.

- 4) In previous volumes¹¹³, various customer service definitions were given by various authors. In most cases, they postulated that customer service was supplied by a customer to a supplier. Various authors including Lalonde and Cooper et.al extended it to include third party suppliers. Most of these authors generally provided valuable insights into customer service from a local perspective. From the voting patterns of the panelists positioned around the globe, customer service differs from country to country and the only way to offer any meaningful service was to solicit the view of the customer at regular intervals. In addition, the best way to improve the supporting systems was to periodically conduct activity analysis¹¹⁴ and look for ideas from outside the company. An examination of the voting patterns of the panel members who held various positions within their respective companies indicated that international customer service could be described as

¹¹² Over 85% of panelists were drawn from Pharmaceutical manufacturing sites and Corporate Planning.

¹¹³ Boateng(1996)^{2&3}.

¹¹⁴ For example through Process mapping an organization can systematically critique the sequence of steps associated with producing an output be it tangible or intangible.

“continuously satisfying a solicited customer need through close working relationships with internal and external service providers”.

To fully accomplish this, not only should an organisation solicit the views of the customer but also benchmark processes against the *best in class*. In establishing a customer service policy, it is clear that overall market penetration and profits should be the main driver. Using this as basis, a clearly defined policy could be put together to enable all the relevant parties and entities to pursue a common goal. The presence of such a policy will help an organisation to become more customer focused.

Analysis & Conclusions drawn from Process Mapping

Critiquing of process steps like the customer order cycle can significantly raise the level of customer service performance by helping to reduce or eliminate the non value adding activities within it. The improvement initiative has enabled the site to solve many of its problems. Today, an hour each day is set aside to brainstorm and resolve problems. Through this, a number of quality problems associated with a number of products have largely been eliminated.

Through the systematic critiquing of the various process steps, the organisation has left behind old methods that negatively impacted on customer service performance. From analysing the various core processes associated with the customer service function, it was notable that the actual lead times were well above the previously demonstrated lead times. Failure

to continuously benchmark and seek ways to improve delivery lead-times between processes had resulted in supply chain uncertainties. As can be seen from table 7, the actual lead times were not on par with the demonstrated lead times. Failure to measure would not have highlighted the delays within the various process steps.

The Process mapping technique proved to be useful in this research in that, it provided a simple but useful means around which performance improvements successfully were initiated. It appeared to minimize bias and some of the problems associated with other performance improvement initiatives. In many cases, the process custodian provided ideas that were used to refine processes.

Chapter 7

Research Contribution and Managerial Relevance of the Results

General

1. The research findings have contributed to both the theory, existing knowledge and practice of the following:-
 - a) International customer service,
 - b) The use of Delphi as a technique for eliciting consensus.
 - c) The use of electronic mail in collecting data.
 - d) The use of process mapping in activity analysis.
2. To date, it is the first study to provide a detailed update on the sourcing patterns of the major Pharmaceutical manufactures for almost two decades. The survey carried out on sourcing patterns of the major Pharmaceutical manufacturers indicated the following:-
 - a) Size in terms of sales¹¹⁵ played a major role in determining whether a Pharmaceutical manufacturer internally or externally sourced its bulk active needs. For example, the survey showed that no Pharmaceutical manufacturer with sales of less than £900 million had vertically integrated Pharma-chemical plants to satisfy its bulk active needs.
 - b) All manufacturers which took part in the survey used external sources for some bulk active needs.
 - c) With external sourcing, all manufacturers had some partnership style agreement for this purpose.

¹¹⁵ 35% of respondents had sales in excess of £900m. This represented over 60% of the top 50 Pharmaceutical organizations in the world.

- d) Only a handful of *Ethical or branded only* manufacturers now existed and almost all the major manufacturers had diversified into Generic, and Over-the-counter manufacturing and sales.
 - e) The Pharmaceutical manufacturing industry was heavily fragmented and that more consolidation was likely to take place¹¹⁶.
3. For international customer service, the need for involvement of people from different parts of the world in this study was necessary because its impact transcends intra and inter organisational boundaries. To date, this study is the first to successfully attempt to elicit in detail, the customer service needs of customers located in more than twenty countries.
 4. Despite various publications on customer service logistics, it still presents problems in some industries. The generic frame work which emanated from the study can be embraced to help in the following:-
 - a) Reduce pipeline inventories, and
 - b) Improve Responses.
 - c) Add value faster than costs.
 - d) Increase delivery reliability.
 - e) Synchronize supply chain schedules.,
 - f) Control material flows in the various distribution channels.
 - g) Improve supply chain costs through lower inventories.
 - h) Reduce cycle times through fast response.
 5. For theorists, the study provided a further understanding of:-
 - a) International customer service between Pharmaceutical and Pharma-chemical manufacturing entities.
 - b) What influenced the sourcing strategies of bulk actives by the various Pharmaceutical manufacturers.

¹¹⁶ Green(1995) op cit. See also recent article by Nolf and Wimer(1997) on the industry.

- c) The use of electronic mail in data collection as opposed to the postal method and the telephone.
 - d) The constructive application of process mapping
6. Whilst publications on the Pharma-chemical/Pharmaceutical industry, Customer service, Delphi and Process mapping have varied in the amount of detail and input requested from practitioners, the present study is:-
- a) The first to elicit a consensus of opinion on international customer service variables,
 - i) Solely from a practitioner point of view and
 - ii) In the Pharma-chemical and Pharmaceutical distribution channel.
 - b) Shed further light on the sourcing patterns of the major Pharmaceutical manufactures.
 - c) Successfully conduct an internal audit through process mapping.
7. This research is the first to directly look at International customer service between a Pharmaceutical and Pharma-chemical manufacturer using the Delphi Technique. For the one in the industry, this study has offered several concrete contributions as to how to conduct a comprehensive but simple international customer service audit through the application of both the Delphi Technique and electronic mail.
8. From reviewing the literature on process mapping, this study is the first to concurrently compare three variables on each process step.

Relevance of the Results to the Organization

Overall, the relevance of the research to the organization can be grouped under three main headings:-

Sourcing Patterns of Major Pharmaceutical manufacturers

With over 60% of the top *fifty* Pharmaceutical organizations participating in the survey, the information gleaned on the sourcing strategies of the major Pharmaceutical manufactures was deemed statistically significant. To this end, it was incorporated into the organization's strategic evaluation on make or buy of bulk active products. Being the first major research of its kind for almost twenty years, participants who took part in the study gained invaluable information for input into their manufacturing strategy evaluations.

Elicitation of International Customer Service Attributes through the Delphi technique

1) Once the views of the customers were known, a *customer service policy*¹¹⁷ that advanced the site's mission statement was developed. Its development was based on the establishment of an objective and operational standards that incorporated customer views, competitor strengths and weaknesses¹¹⁸. The presence of a *written customer service policy* has made a big difference in the way the site orients itself when it comes to dealing with the customer.

¹¹⁷ See Boateng(1997)¹ appendix C7 for a sample of the Customer Services Policy developed.

¹¹⁸The second part of the Delphi questionnaire enabled the panelists to rate the current performance of Pharmaceutical sites relative to the competition and also provide names of *perceived* world class organizations for benchmarking purposes. See also Boateng(1997)¹.

2) With improved information flows, understanding of customer needs resulting from the Delphi and process mapping exercises, the site is currently much more integrated with their Pharmaceutical customers.

Such alignment and improvements have resulted in the following: -

- ➡ Reduction in overall lead-time to major Pharmaceutical customers,
- ➡ Improved delivery reliability,
- ➡ Reduced inventories,
- ➡ Reduced complexities and,
- ➡ More flexible to respond to market changes while simultaneously improving operational efficiencies.

Today, the management of international customer service within the industry has taken on a new meaning. Using the demonstrated lead times as a benchmark, customer service performance has increased dramatically.

Process improvement through Mapping¹¹⁹

As process lead times have improved, the beneficiary has been the customer. Even without the supporting inventories that sustained a number of products, the site's customers are getting their orders *on time, in full* and at the *right quality*.

No forecast goes exactly according to the plan. With reduced cycle times and improved information flows, adjustments are now made to accommodate for any changes in front end demand. The information is *timely* fed backwards into the Pharma-chemical manufacturers planning,

scheduling, manufacturing, and distribution systems. Such *coordinated timely flows* between entities¹²⁰ has enabled customer orders to be processed and dispatched *on time* without the need for any safety stock.

Within a year of initiating process mapping to a number of the site's products, and implementing some of the benchmarks defined by the customers, the site has currently achieved major improvements in all their respective core processes. The most striking thing was how the *cross functional team* were able to work closely with each other to develop a clear understanding of each other and ultimate customer needs. Below is a brief outline of the achievements to date:-

1. As can be seen in table 7, significant lead time reductions have been achieved in each of the core process lead times associated with customer service. Today, the overall average lead time has been reduced from 38 to 12 days.
 - a) The installation of a fax machine and an in-house electronic trading system¹²¹ improved the order receipt and entry lead time by 74%.

¹¹⁹ *ibid.* appendix C4,C5,and C6.

¹²⁰ Including various departments.

¹²¹ Internally developed for receiving and transmitting customer orders.

2. With the various cross functional teams¹²² systematically critiquing various process steps, average lead times pertaining to manufacturing and packaging has being reduced from:-
 - a) 28 days to 20 days for an animal health product.
 - b) 25 days to 16 days for a human health product.
3. The site currently :-
 - a) Manufacture's an animal health product only to order.
 - b) Holds no raw material safety stocks for two major products.
4. With our major suppliers *knowing in advance what we want*, major raw materials are delivered just in time for use in production.
5. Site savings well in excess of £1/2 m has already been realized¹²³.
6. For the first time, the site has achieved same month lead-times for manufacture and delivery of a product. This can be attributed to the *constant* and *timely* information exchange between the site and its customers.
7. Holds virtually no finished goods inventory for two products.

¹²² Including process custodians

¹²³ Ibid. appendix C8-presentations to Senior Management on improvements.

8. Exchange production schedules monthly with:-
 - a) The supplier of major actives and
 - b) Customers.
9. Customer service performance based on the metrics identified is **98%**; an increase of **50%**.
10. Incomplete orders resulting from
 - a) a partial shipment to date is **negligible**.
 - b) Damaged goods in transit is **zero**.
 - c) **No complaints** from out of specification product quality.
11. Customer complaints on variables, e.g. quantity shipped, protocols to date is **zero**.
12. Standard campaign size has been reduced by **50%** for an animal health product.
13. Actual Manufacturing cycle times **now average** the demonstrated manufacturing cycle times for two major products.

With process reliability and improved customer service performance, the focus is now to consistently achieve and improve the customer service performance, core process and demonstrated lead-times. The process

mapping initiative is currently being extended to the site's other products.

In particular, within six months of applying this idea to another major human health product, the site has achieved the following:-

1. The site has reduced standard quality operation lead time by 2 days,
2. On time shipment to a major customer is now 100%.
3. Manufacturing cycle time is now on par with the average demonstrated lead times.
4. Actual transit lead time to the customer is now at par with the demonstrated lead time.
5. Order turnaround for a humanitarian drug has improved by 50%.
6. Quality release time for the humanitarian drug has been reduced by 3 days.

The improvement to date has in fact exceeded what the site expected. The gaining of approval to manufacture another product can be partly attributed to the continuous improvement efforts and accomplishments to date. With senior management's support, each individual and teams on site are continuously questioning their processes and seeking to reduce or eliminate

the non value adding activities within it. The culture change will put the site in good stead to continuously re-engineer its operations¹²⁴.

¹²⁴ Every year Fortune Business Magazine undertakes a survey on the top 1000 companies in the US. Variables measured include quality of management, quality of services and products, financial soundness, innovativeness, environmental, responsibility etc. Fortune every year asks more than 11000 outside directors and Financial directors to rate an organization in terms of the above variables. In 1995 Merck was the second most admired Pharmaceutical organization. [Source Fortune, March 4th 1996. pp. F6.]

Recommendations

Aiming for world class performance means adopting and using a number of tools and techniques to that effect whilst keeping a close eye on the competition. The research has highlighted a number of issues and benchmarks that need to be addressed if processes are to be aligned to world class practices. To do this, a segmented clock supported by a triangular base has been conceptualized to represent the way forward. Each segment represents one of the issues identified in the research. To be able to successfully implement any of the issues there will be the need to continuously conduct internal and external audits to identify and implement cost effective best practices that will result in a positive step change in market penetration and profits.

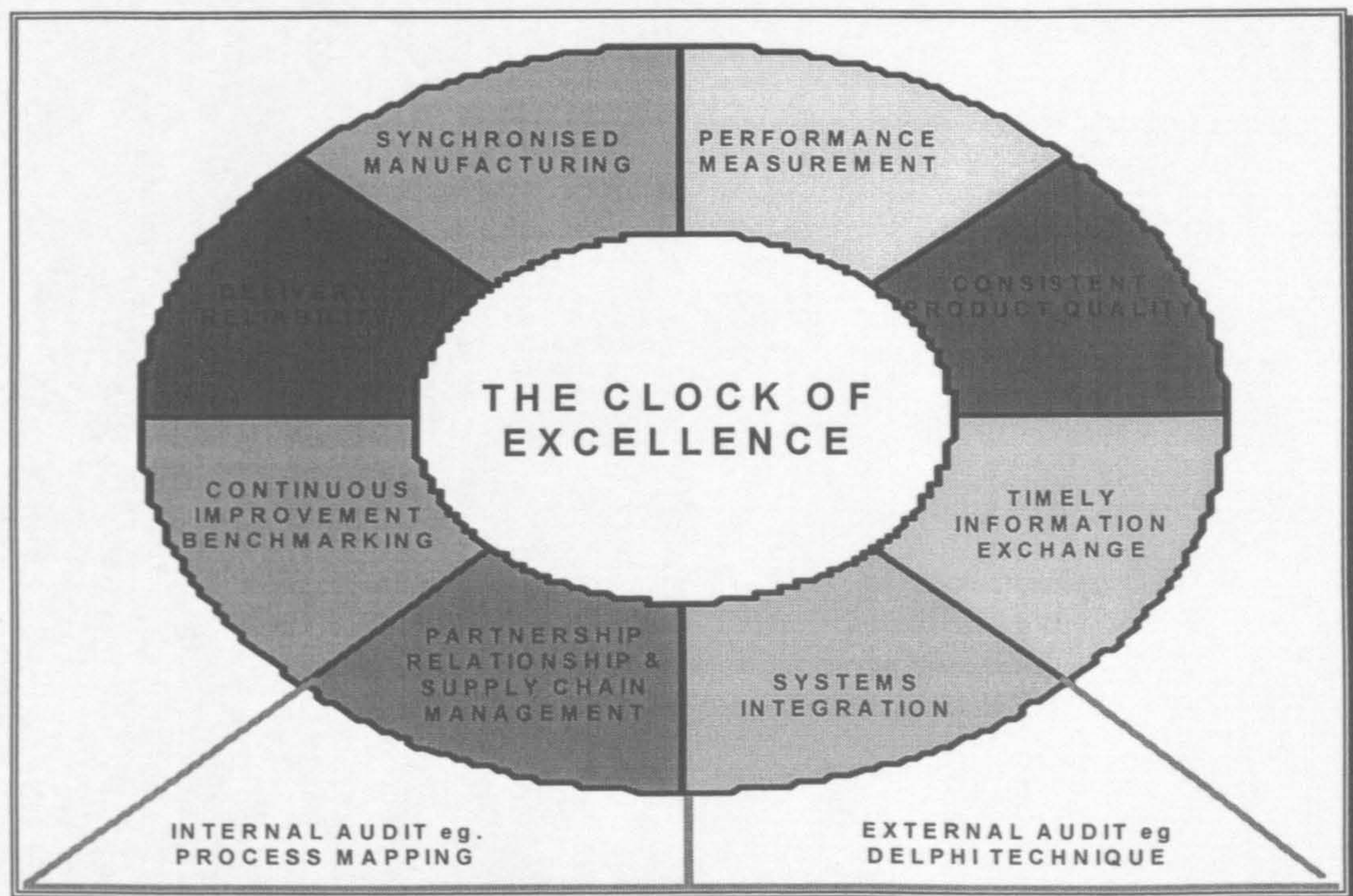


Figure 4-The Clock of Excellence.

The development of any customer service policy must be based on customer needs, competitors strength and weaknesses. The impact of individual customer service activities¹²⁵ on the level of customer service should be quantified to establish any possible deviations from the mean¹²⁶. Once established, regular reports should be sent to the relevant people showing performance to date. Actual performance must always be compared to clearly defined benchmarks¹²⁷. If there are deviations, corrective actions must be taken¹²⁸. It is imperative that a well defined ownership and accountability is also instituted since the *policy* alone will not guarantee improved performance. Automation and integration of processes can have a positive impact on total lead times. Experience has shown that customers in most cases prefer delivery reliability to shorter but erratic levels of performance primarily because it allows them to significantly reduce their safety buffers. With service reliability, a front end customer can spend more time in reducing forecasting errors which can lead to savings in a number of areas¹²⁹.

The Delphi technique was successfully applied to identify a number of customer service and supply chain issues. Supported by continuously

¹²⁵ Activities include material logistics ,and freight forwarder management.

¹²⁶ *Best demonstrated mean*

¹²⁷ It should include best practice benchmarks.

¹²⁸ Process custodians must be involved in the exercise.

¹²⁹ For example raw material and finished product inventories. See also benefits of project to organization

seeking to improve processes through process mapping and benchmarking¹³⁰ as shown in figure 4, an organisation can position itself and its products competitively.

The clock of excellence which incorporates *process mapping* and the *Delphi technique* as supporting tools should not be seen as a panacea for eliminating all manufacturing ills. Rather, it should be seen as framework for identifying and improving issues associated with processes and functions. Customer values change over time. With increasing competition, this time frame is getting shorter. To this end, the segments on the clock could possibly change with time. The only way to align the clock with the latest issues is to go directly to the customer whilst at the same time keeping a close eye on both best practices and the competition to identify possible world class practices.

In addition, the following recommendations have been made as a result of the study.

- 1) Customer service variables identified in this study should be the given necessary consideration by all Pharma-chemical sites when evaluating their customer service policy.
- 2) All the benchmarks identified in the survey must be implemented by Pharma-chemical manufacturing sites.

¹³⁰ Cavinato(1988) describes benchmarking as “a technique that allows an organization to set operating norms, make comparisons against perceived better ways of doing things and to set the basis for all future performance”.

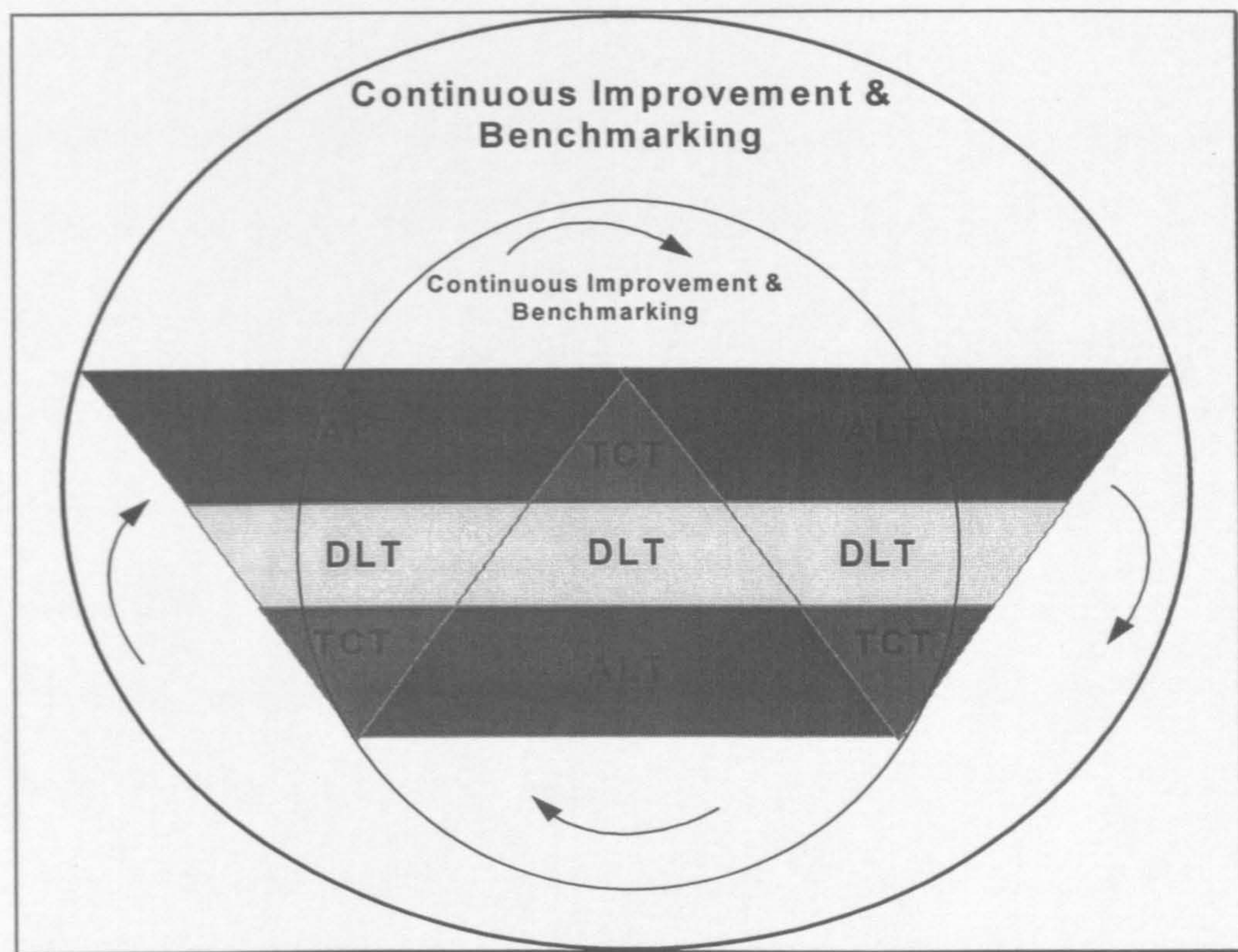


Figure 5. Process Mapping concept-TDA Technique.

- 3) The process mapping concept must be adopted by other manufacturing sites.
- 4) The organisation should aim to extend the improvement initiatives to external key suppliers.
- 5) The Policy maker may use the findings in developing a framework for all Pharma-chemical suppliers.
- 6) All Pharma-chemical, Pharmaceutical, and Distribution sites should institute a policy whereby customer surveys are undertaken every year. Such information gleaned from their respective customers can be used to improve service performance.

- 7) Corporate Planning should institute a policy whereby customer surveys are undertaken every year. Such information gleaned from the customer can be used to refine policy issues relating to customer service.
- 8) All major suppliers to the organisation should be encouraged to institute a policy whereby they conduct customer surveys every year. Such information gleaned from the customer can be used to improve service performance.
- 9) Best practices that exist within the organisation should be published for all and sundry to take note.
- 10) Senior management must encourage continuous improvement by presenting a gift on a yearly basis to sites perceived to be consistent in improving and offering world class services.
- 11) Process improvements programs should be made available to all personnel.
- 12) Process mapping and cycle time reduction should form an integral part of each manufacturing and distribution sites objectives.

Suggestions for Future Research

The Survey, Delphi, and Process mapping applications have all produced meaningful results. Nonetheless, there are still many aspects which will require and would benefit from further research.

Pharma-chemical-Pharmaceutical Industry

- 1) The sourcing patterns of the major Pharmaceutical manufactures were reaffirmed through this study. A re-investigation of the Pharma-chemical Pharmaceutical distribution channels possibly using a different research method would either confirm these findings on sourcing patterns or shed further light onto this competitive tool.
- 2) A comparative study of the manufacturing strategies of the major Generic and over-the-counter Pharmaceutical manufacturers and the major Ethical and Generic manufactures could also help to understand the industry as a whole.
- 3) The findings from the survey on the sourcing patterns supported the view that the bigger Pharmaceutical manufacturer, the more likely it was for it to internally source its bulk active needs. With the current changes sweeping the industry, it would be useful to know whether the sourcing patterns of the major players in the industry have altered or should be altered in future.

- 4) Studies using other groups of people drawn from all sectors of the industry should verify the findings of this research, in particular the international sourcing patterns of the various manufacturers.
- 5) A comparative study between the Pharmaceutical, Electronics and Automotive industries could also throw some light on the procurement strategies of these companies and the reasons behind them.

Process Mapping

- 1) It would be useful to build a spreadsheet simulation model taking into account the demonstrated, theoretical and actual lead-times.
- 2) Any process can be mapped. It would be useful to apply the concept to all the major functions within the organisation.
- 3) It would be useful to encourage all major suppliers to adopt the process mapping concept not only to identify the non value adding activities but also to eliminate any unwarranted delays and costs.
- 4) The concept can also be used to evaluate the current material flow patterns within various supply chains and processes.

International Customer Service

- 1) A similar study should be completed which involves participation of more junior level managers. It would be interesting to determine if their responses vis-à-vis performance and customer service attributes would be the same as the ones chosen by the current panel members.

- 2) Because the statements in stages 2 and 3 were concept statements, they were very general in nature. More focused detailed studies should be conducted on each statement to determine what elements are significant to the field of international customer service.
- 3) The methodology engaged for this study was unable to isolate the voting patterns in specific regions. To segment the attributes into regions, an attempt could be made to expand the sample utilising clustering algorithms for such analysis.
- 4) Expanding the study to include the other links in Chemical-Pharmaceutical-Pharmaceutical-Wholesaling-Dispensing continuums would contribute to the generalizability of the findings.
- 5) The impact of organisational cultures and personalities could throw further light on international customer service performance within global supply chains.
- 6) Additional studies of the same population could be undertaken to determine whether the time of the year influenced the voting patterns.
- 7) A number of statements did not get enough votes to be considered for subsequent rounds. It will be useful for the whole exercise to be repeated with those statements included.
- 8) The present research dealt with a channel where both customers and suppliers in most cases had a close relationship. The study of other channels where there are no such relationships would help shed further

light on how customer service is perceived. Findings from this could provide more evidence to support the need to conceptualise international customer service in the context of an industrial distribution channel. Furthermore, it could provide significant strategic information for the policy maker in a usable and managerially actionable and acceptable form.

- 9) One additional study for the foreseeable future would be to simultaneously solicit the customer service views of the Pharmaceutical-Wholesaler channel of distribution, Pharma-chemical-Pharmaceutical channel of distribution and the Chemical-Pharma-chemical channel of distribution. This will help to further shed some light on whether customer service attributes are similar in each of these channels.

Finally any research that would shed light on the activities of the major Pharmaceutical manufacturers and on international customer service will surely be of immense benefit .

SECTION D

Sequence for Perusing the Research and References

Sequence for Perusing the Research

The report is divided into five major volumes with each having a number of parts. Figure 6 presents a schematic representation of the connections.

Below is a brief outline as to how the research should be carefully perused:-

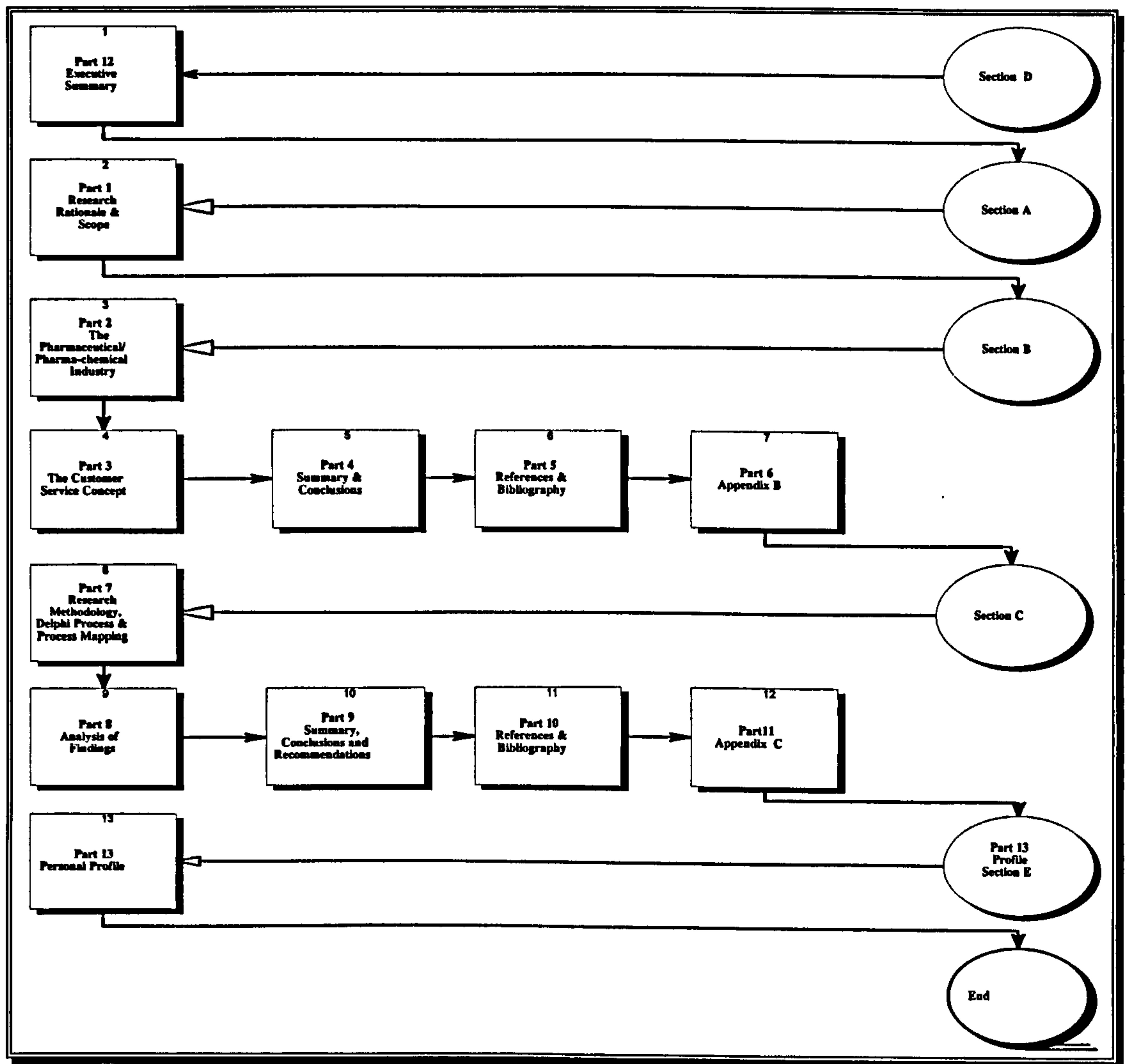


Figure 6. Sequence for perusing the entire project

SECTION D-EXECUTIVE SUMMARY

☞ Section D overviews the overall research and the major contribution to the following:-

- a) General Research.
- b) To the organization.

SECTION A-SETTING THE SCENE.

☞ Section A which includes Part 1 overviews the research rationale and scope.

SECTION B-THE PHARMACEUTICAL INDUSTRY

☞ Section B is made up of five parts.

- a) It starts by overviewing the industry in which the research is set in Part 2. Also included in this part are the following:-
 - i) The sourcing patterns of the major Pharmaceutical manufactures.
 - ii) The sponsoring organization.
- b) Part 3 reviews the relevant literature on the customer service concept.
- c) Part 4 presents a summary of section B and how Pharmaceutical customer service can be re-configured through the Delphi technique.
- d) Part 5 and 6 include references and appendices to the section B.

SECTION C-THE MAIN RESEARCH

☞ Section C consists of Parts 7 to 11.

- a) Part 7 details the research methodologies and design, data collection methods and statistical analysis. Part 7 also includes a time based process map of the current path of a customer order within a supply chain.
- b) Part 8 presents the formal findings of the research.
- c) Part 9 summarizes the research and present the conclusions, recommendations and areas for further study.
- d) Parts 10, and 11 include the references Bibliography and appendix C.

SECTION E-PERSONAL PROFILE

✍ Finally section E which includes Part 13 provides a personal profile, competencies gained, and ongoing activities within the organization.

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